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Surveying Pornography Use: A Shaky Science Resting on Poor Measurement Foundations

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ABSTRACT

A great deal of pornography research relies on dubious measurements. Measurement of pornography use has been highly variable across studies and existing measurement approaches have not been developed using standard psychometric practices nor have they addressed construct validation or reliability. This state of affairs is problematic for the accumulation of knowledge about the nature of pornography use, its antecedents, correlates, and consequences, as it can contribute to inconsistent results across studies and undermine the generalizability of research findings. This article provides a summary of contemporary measurement practices in pornography research accompanied by an explication of the problems therein. It also offers suggestions on how best to move forward by adopting a more limited set of standardized and validated instruments. We recommend that the creation of such instruments be guided by the careful and thorough conceptualization of pornography use and systematic adherence to measurement development principles.

Nineteen sixty-nine was a watershed year for the academic study of pornography, as it marked the launch of the United States President's Commission on Obscenity and Pornography, the first large scale, government-funded, empirical enterprise with an explicit mandate to study pornography use and its assumed harms. This effort resulted in the recruitment of a large number of behavioral and social scientists who initiated a great deal of research concerning pornography, including several attempts to estimate its use and to characterize its users and its effects. In 2019, with nearly 50 years of research to consult, it would appear that somewhere between 10% and 99% of men, and between 0% and 88% of women "use pornography" (Campbell & Kohut, 2017; Hong, Li, Mao, & Stanton, 2007; O'Reilly, Knox, & Zusman, 2007). It is remarkable that despite five decades of empirical research, we still do not know how many people use pornography, or how much they use it. Given this field's reliance on cross-sectional and longitudinal surveys, estimates of pornography use undergird many (if not most) investigations of pornography's assumed effects. If such basic issues around measurement remain unresolved in this field, how confident can we be about the reported impact of pornography?

There are likely many factors that contribute to differences in estimates of pornography use across samples. Chief among these explanations may be differences in sample composition, as factors such as culture (Velezmoro, Negy, & Livia, 2012), age (Wright, 2013; Wright, Bae, & Funk, 2013), gender (Petersen & Hyde, 2010), sexual orientation (Træen, Nilson, & Stigum, 2006), religiosity (Perry, 2016, 2018; Rasmussen & Bierman, 2016, 2017), and social desirability (Rasmussen, Grubbs, Pargament, & Exline, 2018) can inhibit or facilitate the desire to seek out and use pornography or to report such use. Indeed, in the example outlined above, the difference in the estimates provided by Hong et al. (2007) and O'Reilly et al. (2007) may partially reflect differences between Chinese and American students. Sample composition, however, is not the whole story. Large ranges in estimates of pornography use are still reported when comparing studies that are relatively homogenous with respect to sample characteristics. Pornography use estimates restricted to American college-aged males, for example, suggest variously that 59% (Goodson, McCormick, & Evans, 2001), 75% (Willoughby, Carroll, Nelson, & Padilla-Walker, 2014), 87% (Carroll et al., 2008), 92% (Morgan, 2011), or 99% (O'Reilly et al., 2007) of college-aged men use pornography. A closer inspection of such studies reveals another important factor that likely explains some of the variation in pornography use estimates: there are substantial differences in how *pornography use* is conceptualized and measured across studies.

Variability in how pornography use is understood and assessed is a serious barrier to scientific understanding of all aspects of the use of pornography. Heterogeneity in conceptualizing and operationalizing pornography use can contribute to inconsistent findings and prevents direct comparisons of results across studies, impairing the field's ability to evaluate theoretical accounts using accumulated evidence. The fact that this issue has not been seriously addressed, much less resolved, is staggering given the repeated recognition of measurement problems in this field (Bryant & Brown, 1989; Campbell & Kohut, 2017; Fisher & Barak, 2001; Kohut & Campbell, 2019; Marshall & Miller, 2019; Mellor & Duff, 2019; Newstrom & Harris, 2016; Peter &

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Valkenburg, 2016; Seto, Maric, & Barbaree, 2001; Short, Black, Smith, Wetterneck, & Wells, 2012; Vaillancourt-Morel, Daspe, Charbonneau-Lefebvre, & Bosisio, 2019).

With the aim of improving measurement practices in this area, we have systematically reviewed the state of pornography use measurement in the social and behavioral sciences. We then provide recommendations for the development of novel, conceptually-derived, valid and reliable measures of pornography use, based upon accepted principles of measure development. Our review begins by considering problems that are introduced by differences in the use of terminology across studies. We then describe the diversity of current measurement approaches in the field and explain why such approaches limit what can be learned about pornography use. This is followed by a critical examination of existing measures of pornography use of which some evidence of validity exists, and for which future validation efforts could concentrate. The remainder of the paper offers measurement guidance for those wishing to construct new instruments by synthesizing and articulating an inclusive conceptual definition of the construct of "pornography use," emphasizing the importance of measuring specific features of pornography use, and highlighting four issues that researchers should consider when translating a conceptual definition of pornography use into specific operationalizations. This work goes beyond recent reviews in this area (Marshall & Miller, 2019; Short et al., 2012) by incorporating a review of pornography use measurement practices within a broader consideration of inconsistent theoretical conceptualizations of this construct, and offering more explicit guidance to researchers seeking to improve measurement in this field.

The Current State of Pornography Use Measurement

Confusion Over Terminology

Problems in pornography research are rooted in the very terms used to describe this subject of study. In popular parlance, there are highly diverse ways to refer to sexual representations: pornography; obscenity; erotica; smut; in addition, to a plethora of other variants like filthy, indecent, bawdy, adult, X-rated, or dirty pictures/text/magazine/videos/films, and materials. To some extent, the diversity in common terminology used to refer to sexual representations has transferred to academia where terms like pornography, sexually explicit material, visual sexual stimuli, erotica, and obscenity (Vaillancourt-Morel et al., 2019), have all been used to refer to a similar class of materials. There are many reasons for this state of affairs within academic writing, though the most prominent include historical changes in the general meaning of "pornography" (see Kendrick, 1987), the interdisciplinary nature of the field (e.g., obscenity, for example, is a predominantly legal term), attempts to conceptually distinguish between pro-social (i.e.,"erotica") and anti-social (i.e., "pornography") sexual depictions (Check & Guloien, 1989; Fisher & Barak, 2001), and efforts to use value-free expressions that do not carry the pejorative connotations of "pornography" (Vaillancourt-Morel et al., 2019).

The use of diverse terms to refer to sexual representations is problematic for three reasons. First, it is common practice in this field to cite research about sexual representations without acknowledgment of differences in terminology used across papers, or differences in conceptual definitions and assessment wording that may underlie or accompany such linguistic heterogeneity. Second, as has been pointed out elsewhere, adopting different language to refer to the same construct fragments a research literature and interferes with the accumulation and integration of study findings (Reis, 2007). Such fragmentation begins in the most preliminary stages of the research process. In the case of pornography research, for example, dramatically different search returns can occur depending on whether a researcher is looking for studies employing the term "pornography" compared to studies employing the term "sexually explicit Internet materials." Third, and perhaps most critically, exactly what any of these diverse terms refer to (e.g., suggestive pictures, nudity, sexual interactions, sexual health information and products[1], are all genuine examples of what these terms have been invoked to describe) generally remains unstated and obscure.

For these reasons, we encourage the field to unite under specific terminology that can be used to refer to most, if not all, sexual representations. "*Pornography*" may best suit this purpose as it is likely the most widely used term both within and outside academia to refer to sexual representations, even as we acknowledge and guard against automatic acceptance of its historically pejorative and harm focused connotations.

How is Pornography Currently Measured?

To our knowledge, a review by Short et al. (2012) was the first systematic attempt to describe the measurement of pornography use in survey research. This review indicated that 95% of the studies concerning Internet pornography use published between 1999 and 2009 used *unique researcher-devised operational definitions* of pornography use. These idiosyncratic measures of pornography use were often single item assessments that varied in the terminology used to refer to the construct being assessed (e.g., pornography, sexually explicit materials, X-rated materials, etc.), the media assessed (e.g., audio, written word, pictorial, video, Internet, etc.), the time interval inquired about (e.g., ever used, or used in last 12 months, 6 months, etc.), and the response options provided to participants (e.g., Yes/No binary, frequency scales, open-ended/closed-ended time interval responses, Likert scales, etc.).

When it was first published, the review by Short et al. (2012) crystallized and articulated a growing unease among several authors of the current paper, inspired some of us to think more deeply about the concept of pornography use, and contributed to changes in our measurement practices. Nearly a decade later, we have begun to wonder if measurement in this field is still as diverse as Short et al.'s (2012) work suggests

[1]Indeed, some have suggested that "feminine hygiene" products with implied contraceptive functions (e.g., antiseptic douches, creams, jellies, etc.) were introduced by marketers in the 1920s to circumvent the legal regulation of "obscenity" (Sarch, 1997) which at the time was widely applied to both explicit representations of sexuality as well as information about birth control and birth control devices (e.g., condoms).

it is. For this reason, we decided to conduct a 10-year biopsy of the measurement of pornography use covering the period between 2009–2018[2].

To this end, we consulted a research librarian and search strategies were devised to identify as many studies that measure pornography use as possible from three separate academic indices: Pubmed, Scopus, and PsycINFO (see Table 1). In total, we identified 2,693 potential articles, but after results were pooled and duplicates removed, 1,588 articles remained. Next, articles were sampled at random (without replacement) and examined by a research assistant to ensure that each article measured some aspect of pornography use until 100 articles were identified for our review. The measurement sections pertaining to pornography use, and occasionally portions of the results sections (as needed), were extracted for closer examination. All authors then reviewed the excerpted materials and individually noted patterns of variation in measurement practices across the studies. After discussion, the first author (TK) coded a subset of measurement practices, with some support from a second author (LC). A spreadsheet containing references for each study, excerpted text, as well as a record of our coding, can be found on the Open Science Framework (https://osf.io/t3szq/).

Table 1. Literature review search strings by academic index.

Source	Search string	Number of returns
PubMed	((((“erotica”[MeSH Terms] OR “erotica”[All Fields] OR “pornography”[All Fields]) OR pornographic[All Fields] OR “sexually explicit”[All Fields] OR “adult films”[Title/Abstract] OR “adult movies”[Title/Abstract] OR “x-rated movies”[Title/Abstract] OR “x-rated films”[Title/Abstract]) AND (measuring [Title/Abstract] OR measurements[Title/Abstract] OR measurement[Title/Abstract] OR measured[Title/Abstract] OR Measure[Title/Abstract] OR assess [Title/Abstract] OR assessment[Title/Abstract] OR assessment[Title/Abstract] OR questionnaire[Title/Abstract] OR questionnaires[Title/Abstract] OR survey[Title/Abstract] OR surveys[Title/Abstract] OR surveyed[Title/Abstract] OR surveying[Title/Abstract])) AND “last 10 years”[PDat])	516
Scopus	(TITLE-ABS-KEY (pornography OR pornographic OR “sexually explicit” OR erotica OR “adult films” OR “adult movies” OR “x-rated films” OR “x-rated movies”) AND TITLE-ABS-KEY (measuring OR measurements OR measurement OR measured OR measure OR assess OR assessment OR assessed OR questionnaire OR questionnaires OR survey OR surveys OR surveyed OR surveyed)) AND PUBYEAR > 2008	1207
PsychINFO	Noft(erotica OR pornography OR pornographic OR “sexually explicit” OR “adult films” OR “adult movies” OR “x-rated movies” OR “x-rated films”) AND noft(measuring OR measurements OR measurement OR measured OR measure OR assess OR assessment OR assessment OR questionnaire OR questionnaires OR survey OR surveys OR surveyed OR surveying)	970

*With limits applied of past 10 years.

[2]Unbeknownst to us, while we were conducting this review, parallel efforts were also underway by others (see Marshall & Miller, 2019), who published findings that were generally consistent with Short et al.’s (2012) while our manuscript was undergoing peer review.

Coding Overview

In the sample of studies reviewed, the quality of descriptions of how pornography use was measured varied. While some studies provided in-depth descriptions of their measurement practices, most studies did not. For example, 59 of the 100 studies in this sample did not provide clear examples of the items that participants were asked to respond to, and in the 10 of the 100 studies, *no* information was provided about how pornography use was measured at all. What is more, as we worked through these descriptions of measurement, we noticed a number of inconsistencies. At times these issues were limited to relatively trivial linguistic changes, as when Wright (2013) wrote that participants were asked if they had viewed a “pornographic film” when they were actually asked about an “X-rated movie” (see Smith, Davern, Freese, & Morgan, 2019). More concerning were instances where authors described the use of a measure that was adopted from another study, but their descriptions were substantially different from the source they cited. Wurtele, Simons, and Moreno (2014), for example, claimed to have used Wryobeck and Wiederman’s (1999) Sexually Explicit Media Questionnaire which was described as having 11 items. When Wryobeck and Wiederman (1999) was consulted, however, we found that the study included only four items for this measure. Similarly, Foubert and Rizzo (2013) described how their study measured online pornography use with 22 items from Frable, Johnson, and Kellman’s (1997) Exposure to Internet Pornography Questionnaire. However, Frable et al.’s measure consists of 20 items, none of which measure Internet pornography use.

The lack of detail and inaccurate representations in these descriptions of measures of pornography use made the task of coding very difficult. In some cases we relied on how the measures were described in the results section or used our general knowledge of scales employed by certain authors to inform our judgments about how pornography use was probably measured. This process involved a great deal of cross-checking and many revisions of the coding scheme as new information was uncovered outside of method sections or in altogether separate publications. Given these problems, we cannot guarantee perfect accuracy of the report that follows, though we feel that given the circumstances, it is accurate enough for the present purpose.

Idiosyncratic vs. Common Measures

One of the most critical issues concerns the extent to which researchers are still relying on one-off idiosyncratic measures of pornography use or are employing measures used in other studies. Unfortunately, it was not always possible to ascertain the provenance of measures employed by researchers in our sample due to insufficient information, poor citation practices, and the casual adaptation of measures. As best as we can tell, 57 of the 100 studies sampled relied on idiosyncratic measures of pornography use that were not found in other published research. Among the 43 studies employing a common measure, 11 studies (26%) used data from the General Social Survey (Smith, Davern, Freese, & Morgan, 2019), which asks, depending on the year of the survey, “Have you seen an X-rated movie in the past year?” and/or “In the past 30 days, how often

have you visited a website for? … Sexually explicit material." There are six additional studies (14%) that appeared to employ measures based on Peter and Valkenburg's (2006) assessment of pornography use that are worth discussing in more detail. They are noteworthy because they appeared to be founded on a set of items that have been the focus of some validation efforts, but in each case, adaptations were made without clear justification. All six of these studies (Peter & Valkenburg, 2009, 2011b; Vandenbosch & van Oosten, 2017; van Oosten, 2016; Vogels, 2018; Vogels & O'Sullivan, 2019), for example, used only four of the original five items proposed by Peter and Valkenburg (2006), with no mention of why the fifth item (i.e., the use of "erotic contact sites", p. 186), with which the scale validity was originally supported, was excluded. Further, the original scale asked about pornography use over the past six months, but three of these studies used either a two month or a four month assessment window. Finally, three of these studies increased the number of scale points from 6 to 7, and in two cases, this resulted in changing the highest response option from using pornography "once a day" to using pornography "more than once a day." While such changes may seem trivial, modifying the nature of a scale has been shown to impact scale quality (Revilla, Saris, & Krosnick, 2014), and may influence the extent that previous evidence of the scale's validity is still applicable.

Assessing Pornography Use Directly vs. Indirectly

One major distinction that is evident across measurement approaches is that the wording of some questions directly referred to the construct of pornography (e.g., "During the last 12 months on how many days did you view or read *pornography* (i.e., movies, magazines, Internet sites, adult romance novels)?"; Maas, Vasilenko, & Willoughby, 2018, p. 776; emphasis added), or one of its synonyms (e.g., "Have you seen an *X-rated movie* in the last year?"; Perry & Schleifer, 2018, p. 288; emphasis added). Other assessments took a more indirect approach by asking about the use of exemplars of pornography instead (e.g., " … how frequently have you done each of these things in the past 3 years … Read Penthouse magazine"; Frable et al., 1997, p. 317, see Foubert & Rizzo, 2013) without ever mentioning the term "pornography" itself. Of the 59 studies for which item wording was known, 52 articles (88%) used methods that referred directly to pornography (or a synonym) while seven (12%) employed an indirect exemplar-based approach. Most typically (n = 38/52; 73%), this was accomplished by referring to "pornography" or another expression involving it's derivative (e.g., "porn," "pornographic," "child pornography") but there were several studies that asked about the use of "X-rated" (n = 11/52, 21%) or "sexually explicit" materials (n = 4/52, 8%) instead (note, these figures do not sum to 100% because of expressions like "X-rated pornographic movies"; see Rasmussen & Bierman, 2016, p. 195).

Definitions of Pornography Use

Measuring the use of pornography directly or indirectly is an important methodological distinction. Directly measuring use assumes that the term "pornography" (or "sexually explicit materials," or "X-rated") is understood unambiguously and consistently across participants and measurement approaches. There are reasons to believe that this is not the case (more on this below), and as a result, some have recommended that researchers provide their participants with clear definitions of pornography when use is measured (Short et al., 2012; Willoughby & Busby, 2016). A measure of "pornography use" should, ideally, define both "pornography" and "use." Because of the importance of this issue, we have tried to determine if definitions of pornography, and definitions of use, were provided to participants. In the current sample, 26 studies clearly, if heterogeneously, provided a definition of pornography (or a related concept) to participants (e.g., "With pornography we mean any kind of material containing explicit exposure and/or descriptions of the genitals, and clear and explicit sexual acts"; Træen & Daneback, 2013, p. 42), but in 12 of these cases (46%), this detail was not explicitly disclosed in the research report itself though knowledge of the instruments made it possible to make such a determination. Of the 26 studies that defined pornography, three (12%) clarified what was meant by the *use* of pornography and one described (4%) what was meant by *exposure* to pornography. There was insufficient information to determine whether definitions of pornography or use were provided in the remaining studies (n = 74). The issue of diverse conceptual definitions of pornography use is an important problem unto itself and one that we return to in the latter half of this paper.

Breadth vs. Specificity

Some assessments we reviewed sought to measure the use of pornography as a broad category of materials and others sought to measure the use of a specific subset of pornographic materials. Measures varied in breadth or specificity by restricting the nature of the content or the sources of materials that were being assessed. Concerning content restrictions, it appears that the majority of studies sought more global assessments of pornography use (n = 83), while only a minority of studies focused exclusively on particular content (e.g., child pornography, "man-on-man" pornography; n = 4). There was also a subset of studies (n = 13) that included measures of both global pornography use as well as specific content. In these latter cases, general measures were augmented with items that assessed the use of materials involving certain commercial categories of pornography (e.g., amateur, anal, creampie, MILF, etc.), materials featuring particular genders (e.g., transgender) or gender combinations (e.g., male-male), or pornography featuring antisocial (e.g., violence, coercion, etc.), or safer/riskier (e.g., with/without condoms) sexual behaviors. Relatedly, sometimes restrictions occurred because participants were specifically asked about the use of depictions of sexual behavior (n = 20), while the use of depictions of nudity was not inquired about. Indeed in the most extreme cases, participants were explicitly instructed that their use of representations of nudity, such as the images found in *Playboy*, should *not* be reported because it did not constitute "pornography" use. In contrast, measures from 15 studies explicitly included the assessment of the use of depictions of nudity, and 65 were silent on this issue. Other studies

restricted measurement to specific types of media by assessing only the use of videos (n = 16), or videos and pictures (n = 11; i.e., sexually graphic text was often excluded), or the use of Internet/online (n = 21), or offline materials only (n = 2).

Social Context of Use

While not common, some studies (n = 16) assessed pornography use in ways that provided information about the social context of use (i.e., pornography used alone vs. use with others). In most cases, this involved asking participants about pornography use during masturbation or sex with a romantic partner (n = 9). There were also a few cases (n = 3) that did not specifically ask about pornography use during sexual activity, asking instead about whether it was viewed alone or with a partner.

Assessment Window

Most measures of pornography use (n = 61 studies) specified a specific temporal window for their assessments; however, the time sampled varied widely. Such studies inquired about porn use over the course of one day (n = 1), one week (n = 4), one month (n = 7), two months (n = 1), three months (n = 3), four months (n = 2), six months (n = 12), one year (n = 32), or three years (n = 1).

Nature of the Scale and Response Options

Metrics employed in the assessment of pornography use include the "frequency" of pornography use (n = 71), any use/ever used (n = 39), the amount of time spent using pornography in hours or minutes over a certain interval of time (n = 14), age of first use (n = 7), proportion of use (n = 5), amount of media used (n = 3), and milestone-linked use (e.g., before the age of 10; n = 3). Among the measures of frequency of pornography use where it was possible to determine the nature of the response scale that was employed (e.g., 1 = never, 6 = every day), scale point use ranged from three to twelve response options. Regardless of the metric used, studies modally assessed pornography use with a single item (n = 46), though some studies used multiple items to create either a single index of pornography use (n = 24) or multiple indices of use (n = 28). In reviewing the nature of these scales, we also note the conspicuous absence of approaches that can measure specific patterns of a behavior over a temporal window, such as the timeline follow-back method (Sobell & Sobell, 1992), a technique which is widely used in substance use assessment. Instead, the approaches used in this is literature appear to assume a certain degree of constancy in pornography use across time.

Summary of Literature Review

The current review of 100 randomly selected articles drawn from the larger pool of relevant publications between 2009 and 2018 indicates that the measurement of pornography use is still very far from uniform. Compared to the previous report that only 5% (Short et al., 2012; see also, Marshall & Miller, 2019) of studies relied on a previously established measure of pornography use, we found that 43% of the studies employed an operationalization of pornography use that could be linked to other research. We see this as a promising sign for the improved integration of results across studies, but there is still much to improve upon. For example, of all the studies reviewed above, very few (n = 8) offered any evidence of scale validity, and in all but one of these cases, it was clear that deviations from the original instruments had occurred. The extent of variation in current measurement practices, especially when coupled with the lack of apparent concern about scale validity, remains a serious obstacle to the advancement of knowledge in this field.

Variability in Pornography Use Measures is a Problem

To understand why variability in measures of pornography use is a problem, it is helpful to consider a brief digression concerning the general nature of measurement in the natural and social sciences. It is not an overstatement to claim that measurement is the foundation of empirical scientific inquiry. A meaningful system of putting numbers to things is necessary for assessing the realities of the object(s) under study and inferring associations among these numbers. These inferences are used by researchers to describe phenomena and to create, test, and modify theories, and by policymakers to implement programs to tackle social issues (such as the regulation of pornography). Problems with measurement, therefore, result in collections of inferences that are like castles built on sand – initial assertions may appear implacable and easily defended by empirical evidence, but if measurement issues come to light, the foundation of these claims will be eroded, and the whole edifice of inferences will come tumbling down.

Different systems of measurement have been created since humans began to contemplate the world they inhabit and their place within it. For example, there are reliable and valid ways to assess temperature, height, weight, speed, and so on, using either absolute (penile circumference) or relative scales (vaginal pulse amplitude). What they have in common is that they are all characteristics inherent in the object being measured (or at least it is convenient to assume they are). For example, a person weighing 60 kilograms is twice the weight of someone weighing 30 kilograms, and at 0 degrees Celsius, water will freeze, whereas, at 100 degrees Celsius, it will boil. These measures tell us something very meaningful about the properties of the object that was measured. In the social sciences, however, it is usually not possible to measure abstract constructs, including those that concern specific classes of behavior, with such precision. A researcher cannot weigh self-esteem, measure the length of relationship satisfaction, or calculate the relative density of lying to others. Instead, measurement in the social sciences typically relies on assessing abstract constructs by measuring variation in plausible indicators of these constructs and studying networks of the antecedent, construct, and consequent relationships to confer validation on the measure at focus. This system of measurement does not directly assess characteristics inherent in the objects being measured, but rather puts in place rules regarding the particular system of measurement being used and its meaning. The result is that scales are usually either nominal, ordinal, or interval in nature, with each system of measurement having its own set of rules governing how a scale can be created and should be applied (Stevens, 1946; Woods, 2011). When using a 10-point Likert type scale to assess self-esteem across 10 items that plausibly

represent self-esteem, however, it is not the case that a score of 10 represents twice the amount of self-esteem as a score of 5. Furthermore, a score of 10 does not always imply any specific life outcomes compared to a score of 5. Rather, it is often how the scores differ across experimental conditions, or how they are associated with other variables in correlational designs, that allows researchers to make inferences regarding the meaning of relatively high or low scores given the scale endpoints used. Before such inferences can be made, however, scales need evidence of construct validity.

Construct validity refers to the degree to which a measure represents the underlying variation of the construct of interest, and *not that of alternative constructs* (Cronbach & Meehl, 1955). Generally speaking, construct validation requires a clear and justified rationale supporting the selection of items for a scale (e.g., a specific conceptual definition or particular theory), a reliable measure, and evidence of convergent and discriminant validity of the measure (Fried & Flake, 2018). Only when construct validity for a measure is established can researchers use the results to make accurate inferences regarding associations between the variability on that measure and the variability of antecedents, correlates, or outcomes of interest.

In many areas of psychology, however, there is little effort put into developing construct validity (Flake, Pek, Hehman, & Thorndike, 2017). For example, Fried and Flake (2018) highlighted the lack of construct validation for the assessment of depression, a very popular area of scientific inquiry. They pointed out that hundreds of different scales have been used by researchers to assess depression, with a low degree of overlap regarding the symptoms assessed by these different measures. One problem, therefore, is that it is not possible to directly compare the results of the studies using disparate measures of depression because they are not assessing the construct similarly. When researchers have hundreds of measures to choose from to ostensibly assess the construct of "depression," or create their own on the fly, the published literature becomes full of inconsistent and non-replicable descriptions and inferences.

Our discussion of the importance of measurement is directly applicable to the measurement of pornography use. As we have just described, in a randomly selected subsample of the past 10 years of published research on pornography, there is – quite literally – no consensus on the most appropriate ways to define, describe, and measure pornography use.

This degree of variation in how pornography use is measured, understood, and assessed is a substantial problem for the field. As with the case of depression, we fear that it may not be possible to meaningfully compare results across studies that use different measures of pornography use, or to employ the findings from these disparate measures in meta-analyses assessing the associations between pornography use and its correlates or outcomes (a concern that is also shared by Marshall & Miller, 2019), or to adequately test theories of the antecedents, correlates, and consequences of pornography use.

The lack of validation of measures of pornography use raises an additional concern. A common theme among all the measures that we have reviewed is that they asked participants to *self-report* pornography use. It was then assumed that these responses accurately reflected the amount of pornography used (however asked by the researcher) by participants. To our knowledge, there is currently no research that has attempted to determine if self-reports of pornography use actually reflect the amount of pornography used when compared to an objective measure of pornography use (e.g., criterion validity). Instead, researchers (including the authors of this paper) have opted to put faith in the validity of their self-report measures of pornography use rather than take the time to fully establish the construct validity of their measures. This is a critical shortcoming because research concerning Internet and smartphone use (Ellis, Davidson, Shaw, & Geyer, 2018; Scharkow, 2016) suggests that self-report measures of such behaviors (not to mention self-reports of weight, alcohol intake, and number of sexual partners) are surprisingly inaccurate (correlations of self-report and objective measures range from $.10 < r < .40$). If the same is found to be true with respect to self-reported pornography use, nearly all of the available survey research to date may better reflect the correlates of people's perceptions of their pornography use rather than their actual pornography use. Such a turn of events would seriously undermine much of what is thought to be known about the prevalence and impact of pornography use. Taken together, the widespread use of idiosyncratic measures of self-reported pornography use that have been inadequately validated suggests to us that this field of research is a castle built on sand.

Scales of Pornography Use with Psychometric Support

Some readers may feel that we have overstated the case for problems in the measurement of pornography use. Some evidence of validity has been reported for specific scales of pornography use, for example, and the systematic adoption of such scales should improve measurement in the field of pornography research. Migrating away from idiosyncratic measures of pornography use will, at the very least, allow for more direct comparisons of results across studies. Consequently, researchers seeking to improve measurement practice may wish to consider using one of the following measures in their work and further validation efforts.

One of the earliest attempts to validate a pornography use scale was by Frable et al. (1997). In this case, the authors sought to measure the frequency of exposure to and purchasing of pornography as well as other sexual aids (e.g., lingerie, sex toys, etc.) in the past three years. Their approach purposely avoided the use of the term "pornography" in their instructions and measures and primarily assessed pornography use indirectly by inquiring about the use of various exemplars of pornography (e.g., how frequently participants had "seen *Debbie Does Dallas*"; p. 317). Responses were collected on a 7-point scale that ranged 1 – "0 times in the past three years" to 7 – "more than 100 times in the past three years" (p. 317). An initial pool of items involved the assessment of behaviors related to sexually explicit newspapers, magazines, books, movies, catalogs, and stores. Although a Principal Components Analysis (PCA) of these items indicated the presence of six dimensions, after item reduction procedures conducted over several samples, the authors presented a one-component solution representing 20 remaining items. These remaining items involved reading and purchasing pornographic magazines, watching pornographic movies, and visiting "adult"

stores. Across six different samples, the extraction of one PCA component was found to explain between 18–30% of the variance, depending on the sample, and Cronbach's α ranged from .70 to .85. One specific limitation of this scale in the current age is that the items only assess the use of non-Internet pornography, some examples of which may no longer be relevant today (e.g., *Cheri* magazine, *Debbie Does Dallas, Deepthroat*, etc.).

Hald's (2006) Pornography Consumption Questionnaire is probably the most comprehensive measure of self-reported pornography use that has been created to date. This lengthy 65 item tool was used to examine patterns of pornography use within the past 12 months, frequency of exposure, duration of use, age of first exposure, content preferences, the amount of money spent in such pursuits, the social context of use, and any accompanying sexual behavior. Pornography use was assessed directly, and the instrument's instructions provided participants with a working definition of "pornography." This definition did not limit use to online or offline materials but explicitly excluded the use of nude depictions that do not feature sexual behavior. The complete instrument is not presented in Hald (2006), but an inspection of the results section suggests that response options were varied, and likely included dichotomous and Likert scales, as well as "check-all-apply" options depending on the item. Principal Axis Factoring suggested that the following four items could be combined in a unidimensional scale: average time of use per week, frequency of use, pornography consumption when having sexual activity on one's own, and exposure patterns of pornography within the last 12 months.

A five-item measure of adolescent online pornography use by Peter and Valkenburg (2006) has been increasingly used in recent years, a variant of which was employed in six of the 100 articles we reviewed. These authors were sensitive to the challenge of assessing stigmatized adolescent behavior and intentionally adopted a permission-giving approach in their instructions that explicitly recognized that some adolescents purposely seek out pornography. The instructions asked participants to indicate how often they had viewed various types of sexual content on the Internet in the last six months. The use of specific content of interest was assessed with five separate items involving the use of pictures of clearly exposed genitals, movies with clearly exposed genitals, pictures in which people were having sex, movies in which people were having sex, and erotic contact sites. Responses were collected on 6-point scales that ranged from 1 – "never" to 6 – "every day" and these items had a reported Cronbach's α of .92. Evidence of convergent validity was demonstrated by a healthy correlation with the use of offline "porn movies" (r = .63), while discriminant validity was supported by the lack of correlation with the frequency of television viewing (r = .01). Response bias was also examined by comparing self-reports of participants' own pornography use to perceptions of typical adolescent pornography use. The results suggested a small tendency for participant estimates of adolescent pornography use to exceed the sample's prevalence of pornography use, suggesting perhaps, modest under-reporting of pornography use by adolescents in their sample.

More recently, Szymanski and Stewart-Richardson (2014) sought to create a measure of pornography use and problematic pornography use among men because they claimed that "there have been no validated scales that measure men's pornography use" (p. 69). After being reviewed by three experts, 14 items were subjected to Principal Axis Factoring, and two factors were extracted, one tapping pornography use and the other tapping what was labeled problematic pornography use. Loadings of items on the pornography use subscale ranged from .37 to .92, with a resulting sub-scale Cronbach's α of .88. Although the pornography use subscale was said to measure the "frequency" of pornography use it was actually composed of items that measure both the frequency of use as well as the amount of time spent using pornography. These items assess pornography use directly, and were not exclusive to a particular media type or format (e.g., "Taken together, how frequently do you view sexually explicit/pornographic material (such as magazines, movies, and/or Internet sites)?"; Szymanski & Stewart-Richardson, 2014, p. 71). Response options varied between 5- and 6-point scales depending on the item, as did the temporal periods under assessment (five items have no assessment windows while two do). It was claimed that convergent validity was demonstrated by a correlation of r = .27 between pornography use and responses to a modified version of the Internet Sex Screening Test; however, this correlation appears to be largely driven by shared variance with the problematic pornography use subscale. If one controls for problematic pornography use (correlated r = .47 with pornography use and r = .71 with the Internet Screening Test) the remaining association suggests that pornography use and the Internet Sex Screening Test are essentially independent, r = .07. Modest negative correlations with relationship duration and social desirability were also offered as evidence of discriminant validity. However, some have noted that pornography can be used to compensate for lack of sexual interactions with a partner (Kohut, Fisher, & Campbell, 2017), which increases with relationship duration, and pornography use is a stigmatized behavior, so these correlations might also be interpreted as weak evidence of convergent validity.

A very recent approach by Leonhardt and Willoughby (2019) also deserves attention. In this work, pornography use (as well as the use of "provocative sexual media") was assessed indirectly using items that were inspired by research concerning the conceptual meaning of pornography. Previously, Willoughby and Busby (2016) had written twenty items that described potential exemplars of pornography (e.g., "A video of a woman or man alone masturbating", p. 681), and asked a large sample of men and women to indicate the extent that they believed that each example constituted pornography. Using these data, Leonhardt and Willoughby (2019) measured the use of the four types of materials that received the highest pornography ratings (e.g., "An image of a heterosexual couple having sex which shows the man's penis penetrating the woman," "A video showing a woman having sexual intercourse with an animal," "A video that graphically depicts a three-way sexual encounter," "A video showing two naked women or men manually stimulating each other") and averaged the responses together (Cronbach's α of .91). Confirmatory factor analysis confirmed the distinction between their measure of pornography use and their measure of provocative sexual media, but measurement invariance

suggested the scale responses operated differently in men and women in their sample.

While we feel that these multi-item approaches represent some of the best available measures of pornography use, each of these approaches still fall short. In all cases, thorough validation efforts are lacking, perhaps because these measures are primarily scales of convenience that were constructed to further another specific research focus. The design of these scales has not followed from the careful consideration of a clearly articulated conceptual definition of pornography use. Generally, they do not appear to be comprehensive, in that they fail to assess pornography use across different types of media and modes of access, fail to measure different types of content, or fail to consider different social and sexual contexts of use. Further, outside of internal consistency, little effort has been made to consider the reliability of these scales or to conceptualize the degree to which pornography use should be reliable. In analyses, these scales were treated as continuous variables despite the fact that no efforts appear to have been made to examine whether the latent dimensions represented by the scales are best considered continuous or categorical in nature. Further, these scales have typically been used as if the same construct is being measured across different groups of participants even though measurement invariance has been infrequently tested, and is yet to be demonstrated. Crucially, the accuracy of these scales for predicting objective measures of pornography use remains completely unknown.

Toward New Measures of Pornography Use

The literature that we have reviewed suggests the need for advances in the measurement of pornography use. Poor measurement practices in the field of pornography research may stem from the fact that developing reliable and valid measures takes a great deal of time and effort. It first requires a *conceptualization of the nature of pornography use* – just what is pornography, and what constitutes use? Once such questions are answered, researchers can then develop items for a self-report scale, for example, that reflects this theoretical definition of pornography use. Additional research would then be required to select items and assess the reliability of the scale, as well as assess evidence for construct validity, including especially, evidence of criterion validity. If there is evidence that variation on the scale is indeed capturing differences in actual pornography consumption (however defined by the theory) and not other constructs (e.g., masturbation, sensation seeking, erotophilia, etc.), then inferences regarding pornography consumption as measured by this scale and antecedent, correlate, and consequent variables of interest can be made. Both our own review, and those conducted by others (Marshall & Miller, 2019; Short et al., 2012) suggests this has not been the case in survey research concerning pornography use. For this reason, we offer the following suggestions for those seeking to create improved measures of pornography use for survey research.

Good Measurement Begins with a Good Definition

Measurement should begin with a conceptual definition of the construct of interest. A good definition should identify and describe the construct, determine its level of abstraction, and consider its breadth and delineation from other closely related constructs (Flake et al., 2017; Gehlbach & Brinkworth, 2011). Ideally, such a definition should follow from the careful consideration of relevant research and theory as well as data concerning lay conceptualizations of the construct (Gehlbach & Brinkworth, 2011). With respect to "pornography use," we need a construct definition that elaborates on the meaning of both "pornography" and "use" that has both theoretical and empirical foundations so that meaningful, reliable, and valid measurement approaches can be developed. To date, some work has considered the issue of "pornography," while very little, and perhaps none, has seriously considered the issue of "use."

What is "Pornography"?

Although many different scholars have discussed and studied this issue (McKee, Byron, Litsou, & Ingham, 2019), the most comprehensive empirical analysis of the concept of pornography can be found in Kohut's (2014) doctoral dissertation. This work begins by outlining the tremendous variability in conceptual definitions of pornography among academics but focuses mostly on understanding laypersons' conceptualizations of this construct. Kohut's (2014) work concludes that while it may be difficult to articulate an explicit definition of pornography that captures all of the necessary and sufficient criteria for demarcating pornographic materials from other materials, mental representations of this construct among undergraduate students are at least as consistent across individuals as other categories that have been studied.

As described in Kohut's (2014) research, the concept of pornography has been associated with varied definitions. The term itself is said to have etymological roots in Greek words "pornae" (prostitute) and "graphos" (to describe) and was first used in the 19th century. Kendrick (1987) has previously traced one origin of this word to the written reports of sex workers and sex work as a matter of public – and often concurrently, moral – health. Around the same time, pornography was also used to refer to sexual artifacts that were being recovered from the newly uncovered remains of Pompeii (Kendrick, 1987). Perhaps it is because of these artifacts that pornography has largely come to refer to a class of materials of a sexual nature, though precisely which sorts of sexual materials are considered pornographic and which are not remains a divisive issue within academic circles.

Within empirical circles, there are two general approaches to defining pornography (Mundorf, D'Alessio, Allen, & Emmers-Sommer, 2006; See also, McKee et al., 2019; Short et al., 2012); one emphasizes the "structure" of pornography while the other emphasizes the "function" of pornography. Structural definitions of pornography focus on describing the nature and content of pornographic materials (e.g., "cheesecake" photos), while functional definitions focus on the intended or actual function (e.g., intended to arouse) of pornographic materials. Structural elements that Kohut (2014) identified in a thematic analysis of 21 published academic definitions of pornography included the depiction of nudity, sexual behavior, fantasy, sexual content, degradation, and

violence. Similarly, functional elements that were identified included sexual arousal, sexual oppression, sexual offense, commercial profit, and artistic expression. Most academic definitions of pornography are composed of one (e.g., "a communication material provided for the purpose of sexually arousing or gratifying a user"; Kuhn, Voges, Pope, & Bloxsome, 2007, p. 168) or more (e.g. "the representation of directly or indirectly erotic acts with an intrusive vividness which offends decency without aesthetic justification"; Elliot, 1970, pp. 74–75) of these structural and functional elements. Aside from these dominant approaches to defining pornography, it is also important to point out that some scholars insist that pornography is an evolving concept that lacks innate characteristics (McKee et al., 2019). While such a view may be appropriate in the humanities, it is entirely unhelpful for measurement purposes.

In addition to the general variety found in definitions of pornography, we also note that some academic definitions of pornography directly contradict one another. This often occurs in the context of definitions that attempt to delineate the nature of sexual content that should be considered pornographic. Certain definitions, for example, include depictions of *implied* nudity or sexual behavior (Elliot, 1970; Flood, 2009), while others require *explicit* depictions of nudity and sexual behavior (Wetterneck, Burgess, Short, Smith, & Cervantes, 2012). Even among definitions that focus on explicit nudity and sexual behavior, there is disagreement about whether (Lo, Neilan, Sun, & Chiang, 1999) or not (Hald & Malamuth, 2008) nudity in the absence of sexual behavior constitutes pornography. Some definitions disagree further by asserting that sexual content is irrelevant:

> "[e]xplicit sexual imagery in itself is not the defining feature. Instead, it is the conjunction of a single purpose – to elicit or enhance subjective sexual arousal – and structure – a lightweight version of fictional drama – that is crucial" (Mosher, 1988, pp. 65–69)

Conflicting definitions of pornography impact operationalizations of pornography use, contributing to the problems that we have outlined above. For this reason, we believe that it is imperative that empirical researchers work to standardize a universal definition of pornography (and use). With the competing views of pornography among academics, and the need to articulate definitions that are meaningful to those responding to assessments, definitions of pornography should also be informed by lay understandings of this construct.

Lay Conceptualizations of Pornography

While there is variation in laypersons' open-ended definitions of pornography, most people appear to agree about the central components of this construct. A content analysis of definitions of pornography provided by undergraduate men and women found that the depiction of sexual content (84%), particularly the portrayal of sexual behavior, was most frequently mentioned (Kohut, 2014). In a follow-up study, a further sample of male and female undergraduates was asked to indicate the extent that each of 19 definitional components of pornography reflected a central aspect of their understanding of this construct (Kohut, 2014). The results indicated very strong endorsement of the sexual arousal and gratification functions of pornography, as well as the depiction of sexual behavior, while the rates of endorsements for the depiction of nudity, or the belief that pornography required more than just the depiction of nudity were less common but still high. These results suggest that people believe that pornography is a material that depicts sexual behavior, and to a lesser extent nudity, that is likely to trigger sexual response. A standardized conceptual definition of pornography can also be informed by research that has shown lay individuals examples of various materials and asked them to make judgments about the extent that such materials are pornographic (Kohut, 2014; McDowall, 2008; Turnbull & Brown, 1977; Ware, Brown, Amoroso, Pilkey, & Pruesse, 1972; Willoughby & Busby, 2016). Despite claims that definitions of pornography are idiosyncratic (see Ciclitira, 2002), what is clear from this work is that people can reliably rank order the "pornographicness" of individual media exemplars. This is consistent with the view that internal representations of categories often lack discrete boundaries and are better understood as graded rather than discrete phenomena (McCloskey & Glucksberg, 1978). Importantly, Kohut (2014) reported that group-level judgments about the extent that images are considered pornographic could be predicted with a high degree of accuracy (r = .83) by considering just the presence and absence of specific observable cues (e.g., hand-genital contact, erect nipples, exposed navel ring, etc.). Given these findings, it would appear that consideration of a material's function is generally not necessary for identifying how pornographic consumers believe it is. Moreover, in considering the family resemblance structure of pornography, this research found that cues concerning the depiction of specific aspects of nudity (e.g., breast, nipple, vulva, penis, etc.) tended to be more common among images that were considered very pornographic than were cues that concerned specific sexual behaviors (e.g., masturbation, oral sex, intercourse, threesomes, etc.). Consequently, Kohut (2014) argued that conceptual definitions of pornography should consider the depiction of nudity as well as sexual behavior within definitions of pornography if researchers wish to align their understanding of pornography with that of lay individuals.

Some have argued that there is an important contextual element when defining pornography (Ashton, McDonald, & Kirkman, 2019; Ciclitira, 2002; McKee et al., 2019). And indeed, there is a small literature that has identified some individual differences in pornography judgments (Byrne, Fisher, Lamberth, & Mitchell, 1974; Kohut, 2014; Reed & Reed, 1972; Turnbull & Brown, 1977; Willoughby & Busby, 2016). In general, these studies have reported that women, as well as people who are high in religiosity, high in authoritarianism, and low in experience with pornography tend to rate exemplars as more pornographic. Despite claims that such findings indicate that "substantial variation" (Willoughby & Busby, 2016, p. 684) exists across pornography judgments, the reported effects tend to be quite small, especially when compared to the amount of variation that can be attributed to content differences across exemplars. While it is clear that some variation in pornography judgments depend on the type of person making the judgments, in our view, these individual

differences are not large enough to undermine the utility of adopting a standardized conceptual definition of pornography for use in research.

What is Pornography "Use"?

A complete consideration of the construct of pornography use also requires a consideration of what is meant by "use." From a theoretical perspective, many accounts of pornography's effects on various psychological, interpersonal, and behavioral outcomes (e.g., the Confluence Model, Malamuth, 2018; social comparison theory, Morrison, Bearden, Harriman, Morrison, & Ellis, 2004; self-objectification theory, Tylka, 2015; $_3$AM; Wright, Tokunaga, & Bae, 2014) rely on the assumption that exposure to pornography triggers downstream cognitive, affective, and behavioral changes. While not stated explicitly, one would assume that researchers who adopt such perspectives typically measure the *use* of pornography as an indicator of the broader construct of *exposure* to such materials.

Employing terms like "use" (or "consumption," as is sometimes done) implies that researchers are specifically interested in motivated and purposive exposure to pornography rather than accidental, coerced, or forced exposure. While seldom discussed in research concerning adults, the literature concerning pornography exposure among adolescents frequently distinguishes between intentional and unintentional exposure (Peter & Valkenburg, 2016), and often finds that unintentional exposure is more commonly reported in such samples. It has been noted elsewhere that the decision to include a consideration of unintentional exposure in surveys of adolescents, as well as young participants' reports of such exposure, may reflect discomfort with the idea that youth intentionally seek pornography for its sexually arousing properties, as it suggests youths are sexually motivated (Prause, 2019). Further, viewing pornography can be illegal for youth, even when it is not for adults, which may also influence reporting of unintentional use. Regardless, at present, the role that true unintentional exposure to pornography plays in cognitive, affective, and behavioral changes remains an under-developed issue that is somewhat beyond the scope of this discussion. Suffice to say, the validity of focusing on intentional use over total exposure when exploring the issue of pornography's presumed impacts has yet to be demonstrated.

Antecedents of Pornography "Use"

Even if one assumes that the focus on intentional exposure to pornography is justified, understanding pornography use is still not a simple matter as it reflects more than just exposure to pornographic materials. The choice to seek out (or avoid) pornographic materials is likely driven by a number of important antecedents, some of which may be more proximal causes of the assumed effects of pornography use than the use itself (Bogaert, 2001; Campbell & Kohut, 2017). For example, an individual who seeks out pornography may be influenced by unrequited sexual desires within a romantic relationship, and the unrequited desires may be of greater importance than the pornography use for understanding relationship functioning in such cases. Recognizing such factors, and accounting for them in research designs, should help to reveal the actual effects of pornography use, free of potential third-variable confounds.

To better appreciate the antecedents of pornography use, it is important to consider the motives for such use. A recent review of the relevant literature indicates that sexual arousal and sexual enhancement were by far the primary drivers of pornography use, but other motives exist as well (Grubbs, Wright, Braden, Wilt, & Kraus, 2019). Such motives include coping and stress relief, avoidance of boredom, curiosity and information seeking, and intimacy motives (specifically for shared pornography use with a sexual partner). To a large extent, research indicates that pornography use is driven by its hedonic value, and as a corollary, researchers should expect that poor subjective well-being may sometimes be the cause of pornography use, rather than solely or mostly a consequence. Consistent with this view, at least one lagged longitudinal study has demonstrated that low life satisfaction temporally precedes increases in pornography use (Peter & Valkenburg, 2011b), while another has found that pornography use itself was not related to increases in distress over time (Grubbs, Stauner, Exline, Pargament, & Lindberg, 2015). Additionally, the fulfillment of sexual desire which drives pornography use may itself be an important contextual element to consider. A recent study, for example, found that a negative association between pornography use and relationship quality was reversed to a small positive association after controlling for masturbation frequency (Perry, 2019). This finding suggests that masturbation which commonly accompanies use, rather than viewing pornography per se, could be a critical determinant of at least some of pornography's presumed effects.

Considering potential antecedents of pornography use, it is also important to note that while acceptability of pornography appears to be increasing over time, pornography use remains riddled with moral implications (Grubbs, Wright, et al., 2019). A recent national Gallup Poll in the United States, for example, indicated that while many Americans (43%) believe that pornography use is morally acceptable, a sizable portion (36%) do not (Dugan, 2018). Negative attitudes toward pornography are particularly common among women, older persons, political conservatives, and those with stronger religious affiliations (Dugan, 2018; MacInnis & Hodson, 2016). Given the prevalence of negative attitudes, it is no wonder that some pornography users experience significant anxiety, guilt, and distress about their use (Grubbs & Perry, 2019; Grubbs, Perry, Wilt, & Reid, 2019), report mixed emotional responses following laboratory viewing of pornography (Peterson & Janssen, 2007), and try to hide their use from others, sometimes lying about it to their romantic partners (Kohut et al., 2017). While understudied, negative personal, relational, and social attitudes likely influence the specific nature of pornography use behavior (e.g., the extent of use, solitary vs. social use, hidden use, accessing porn online vs. offline, etc.) and effects. Unfortunately, the role that stigma plays with respect to pornography use is rarely considered in research to date (Grubbs, Wright, et al., 2019).

Along with the motives for using pornography and the attitudes surrounding its use, several dispositional, social, and environmental factors may be relevant for understanding the antecedents of pornography use. Research among adolescents

and adults suggests that pornography use is associated with: being male (Petersen & Hyde, 2010); young adulthood (Wright, 2013; Wright et al., 2013); low religiosity (MacInnis & Hodson, 2016); sensation seeking (Peter & Valkenburg, 2011b); impulsiveness and low self-control (Brown & L'Engle, 2009; Hardy, Steelman, Coyne, & Ridge, 2013); narcissism and entitlement (Grubbs, Wright, et al., 2019); attachment insecurity (Tylka, 2015); erotophilia-erotophobia (Fisher, White, Byrne, & Kelley, 1988); sex drive (Baer, Kohut, & Fisher, 2015); delinquency (Wolak, Mitchell, & Finkelhor, 2007); substance use (Ybarra, Mitchell, Hamburger, Diener-West, & Leaf, 2011), and pubertal timing (Beyens, Vandenbosch, & Eggermont, 2015). Further, environmental and social factors have also been identified, including family dynamics (Mesch, 2009); peer influence (Weber, Quiring, & Daschmann, 2012); the use of pornography by a romantic partner (Kohut, Balzarini, Fisher, & Campbell, 2018); relationship status (Carroll, Busby, Willoughby, & Brown, 2017); and Internet access (Mitchell, Finkelhor, & Wolak, 2003). This research clearly indicates that particular individuals in specific social and environmental circumstances are more likely to seek out pornography. By extension, measures of pornography use reflect not only the use of pornography itself, but also a host of other variables.

The Nature of Pornography "Use" Behaviors

In addition to the consideration of relevant antecedents of pornography use, it is also important to be clear about exactly which behaviors fall under a conceptual understanding of the use of such materials. Even if we limit the term "use" to willing self-exposure to pornographic materials, there are a number of ways in which this behavior can be expressed, each of which may have unique antecedents and consequences. Pornography can, and typically is, used alone, sometimes with romantic partners, and infrequently in a social context with acquaintances, peers, or friends (Hald, 2006; Kohut et al., 2018). Relatedly, pornography can be used in private settings (e.g., residence, hotel room, etc.) or more public settings (e.g., schools, libraries, airports, coffee shops, restaurants, public transit, etc.). Independent of whether or not it is used privately or in public, pornography use behavior can also vary in the extent that it is intentionally kept hidden from others (e.g., shielding screens from others, use of "incognito" mode, use of VPNs that disguise IP addresses, cache clearing, toggling between applications when use is directly observable, etc.). At present, all conceptual definitions of pornography use fail to recognize this diversity in intentional self-exposure to pornographic materials.

To further complicate matters, there are yet other ways to conceptualize the use of pornography beyond just willing self-exposure. One can, for example, seek out, collect, and store pornography, as some individuals do, and at least one study has assessed "pornography use" by determining whether or not pornography had been downloaded and stored on a personal media device (Vanden Abeele, Campbell, Eggermont, & Roe, 2014). With the advent of digital media recording devices, pornography has become easier than ever to produce, and coupled with advances in communication technologies, has contributed to the phenomenon of sexting, which can involve the exchange of self-made pornography. Importantly, all of these behaviors and potentially others (e.g., searching for, accessing, acquiring, purchasing, storing, producing, exchanging, etc.) can result in exposure to pornography, and in a broad sense, many of these behaviors in themselves also constitute the "use" of pornography, at least to some degree. Where exactly researchers should "draw the line" when it comes to such behaviors remains an undecided issue.

It is our belief that if we truly wish to understand the prevalence, antecedents, correlates, and effects of pornography use, then conceptualizations of the use of such materials should go beyond intentional self-exposure by considering other pornography-related behaviors. Take the case of a man who looks at pornographic images in a magazine compared to a man who looks at pornographic images online. On the surface, these may seem like very similar exposure behaviors, but they stem from fundamentally different acquisition behaviors that should also be considered. When magazines are acquired in person, one needs to visit a physical store, choose content from a limited domain of options, exchange money, and allow other people to be aware of one's pornography use intentions, which can also involve exposure of one's particular pornographic content preferences (e.g., purchasing a magazine titled *18eighteen* has very different implications than purchasing a magazine titled *MILF Hunters*). The use of pornographic images on the Internet, in contrast, is a very different process. It requires a reasonable Internet connection, but if that is available, it can be done with little to no effort, involves a universe of content choices that are not limited to what physical purveyors decide to stock their stores, it can be consumed at no cost, and does not directly require that other people become aware of one's behavior. Given these differences, it is no wonder that the acquisition of physical pornography has declined with the availability of the Internet of pornography. In this contemporary context, it is likely to us that those who continue to seek offline pornography represent a unique individual difference profile among pornography users (e.g., more likely to be male, higher attraction to pornography, low in social desirability, etc.), some characteristics of which may be relevant for studying the assumed antecedents and consequences of pornography use.

Suggested Conceptual Definition of Pornography Use

As is apparent from this review, the conceptual meaning of "pornography use" is broad, as there are many different ways that one can define pornography and consider its use. Having said that, for those wishing to develop a standardized inclusive conceptual definition of pornography use for more systematic empirical research, several theoretically- and empirically-guided criteria can be extracted from this discussion. Pornography may be a sophisticated concept deserving of ongoing nuanced consideration; however, nearly every conceptualization of this construct indicates that pornography is a media representation with sexual qualities, which generally requires the depiction of nudity at minimum. While less widely discussed, use of pornography typically denotes willing self-exposure to such materials though use can be more broadly defined as well in terms of other pornography-related behaviors. Importantly, the use of pornography can also occur in a variety of locational (e.g., in a residence, in a business or occupational setting, in public, etc.), social (e.g.,

solitary, with peers or friends, with romantic partners, etc.), and behavioral (e.g., while enjoying a morning coffee, during masturbation, during partnered sexual activities) contexts, and can involve the use of one or more types of online or offline media. Given its intentional and contextual nature, specific manifestations of pornography use may be driven by unique combinations of antecedent factors and possess unique correlates and consequents.

Summarizing this review of the literature, it is our opinion that the construct of pornography use should be defined as follows:

> Pornography use is a common but stigmatized behavior, in which one or more people intentionally expose themselves to representations of nudity which may or may not include depictions of sexual behavior, or who seek out, create, modify, exchange, or store such materials. Pornography use can involve one or more types of online and offline materials, and can occur in a variety of locational, social, and behavioral contexts. The extent and nature of such behaviors are regulated and shaped by a combination of personal and social hedonic motives, as well as other individual differences and environmental factors. Pornography use can evoke immediate sexual and affective responses, and may contribute to more lasting cognitive, affective, and behavioral changes.

We should note that this conceptual definition is not intended to be used as a working definition that is provided to participants as a part of a survey's instructions, though we feel that it could inspire such definitions (an example of which can be found in the final section of this review). Instead, it is intended to guide researchers in their thinking about pornography use in a way that embeds this construct in a nomological network of other relevant constructs. In other words, it is a general theory of "pornography use" that is meant to inform the development of specific operational definitions in survey research (i.e., measures of pornography use) and potentially, experimental designs as well (i.e., the nature of experimental manipulations)[3]. It is our view that constructing a conceptualization of "pornography use" that explicitly incorporates a discussion of its prevalence, stigmatization, motives, and consequences, alongside a description of the specific behaviors at focus, will encourage deeper consideration of these issues when research is designed and data are interpreted.

Importantly, various aspects of our description of pornography *use* (e.g., exposure vs. seeking vs. sharing pornography) are non-equivalent and should not be treated as if they were. It may be the case that some of these elements are more relevant in different research and application settings, and consequently, we believe that this definition can and should be translated into separate operationalizations that reflect these various underlying behaviors. Further efforts are needed to consider how these separate facets of pornography use are conceptually and empirically related.

We also recognize that not everyone will agree with this definition, and we welcome alternative perspectives from the field. Regardless of which overarching definition researchers eventually choose to adopt, it should be adopted systematically across the field. It is important that such a definition follows from a reasoned consideration of the nature of the materials and behaviors that are at issue, and that it prompts the careful understanding of a network of factors that may themselves be causes of the putative effects of pornography. Such a nuanced conceptual definition is imperative in a causally-oriented field that is dominated by correlational research designs in which relevant confounding factors are often not considered.

Content Differences in Pornography

Conceptual and assessment challenges in this area are not limited to the assessment of pornography use as a broad construct. Pornographic media are complex stimuli (D. Brown & Bryant, 1989); although they primarily involve the depiction of nudity and sexual behavior (Kohut, 2014), the manner and context in which this is represented differ tremendously from stimulus to stimulus. A review of content analyses of pornographic materials reveals substantial variation in depictions of nudity and sexual activity across a range of content-dimensions (see Barron & Kimmel, 2000; Bogaert, Turkovich, & Hafer, 1993; Bridges, Wosnitzer, Scharrer, Sun, & Liberman, 2010; Brosius, Weaver, & Staab, 1993; Cowan & Campbell, 1994; Cowan, Lee, Levy, & Snyder, 1988; Dietz & Evans, 1982; Fritz & Paul, 2017; Garcia & Milano, 1991; Gossett & Byrne, 2002; Harmon & Boeringer, 1997; Klaassen & Peter, 2015; Mehta & Plaza, 1997; Paasonen, 2006; Palmer, 1979; Palys, 1986; Rosegrant, 1986; Scott & Cuvelier, 1987b, 1987a, 1993; Smith, 1976; Vannier, Currie, & O'Sullivan, 2014; Winick, 1985; Yang & Linz, 1990). Pornographic depictions vary in their degree of explicitness (e.g., extent of nudity, genital detail, etc.); the number of persons depicted; the physical characteristics of the performers (e.g., sex/gender, age, race, weight/body type, attractiveness, pubic hair grooming, etc.); the roles performers play (e.g., "faceless penis" non-entities, insatiable women, active sexual partners, passive recipients, victims, etc.); the nature of the relationship(s) between performers (e.g., work relationships, service-client relationships, incestuous relationships, unspecified relationships, etc.); the sexual behaviors that are depicted (e.g., none, penile-vaginal, oral, anal, use of toys, etc.); the extent of power differences, control, coercion, and aggression (e.g., hair pulling, slapping, punching, gagging, choking, etc.); the presence or absence of safer sexual practices; the pleasure experienced or not experienced in the portrayal; and potentially many other factors.

Pornographic media are particularly complex because various content elements of pornography can be combined in

[3]The question of how pornography use should be operationalized in the experimental literature is a related but somewhat separate issue as other aspects of validity must also be considered. Regardless, all operational definitions, including experimental manipulations, should stem from a well-considered conceptual definition of the construct of interest, and while our focus in the current paper involves the measurement of pornography use, the preceding discussion may provide some useful guidance for experimental work as well. We would note that the application of a common conceptual definition of pornography use across surveys and experiments would make both branches of research more mutually informative of one another. For this reason, we encourage the field to further consider the extent that past, current, and future experimental manipulations conform to conceptual definitions of pornography use that are used in survey research and vice-versa.

nearly infinite ways. Take the act of *fellatio*, for example; generally, all depictions of *fellatio* are considered pornographic, but depictions of *fellatio* can still vary considerably in their make-up. Typically, *fellatio* in pornography involves one male and one female partner, but it can also involve two male partners, two female partners (e.g., simulated *fellatio* performed on a strap-on or other toy), trans partners, more than two sexual partners, and in rare instances, a single flexible person with a penis (i.e., *auto-fellatio*). *Fellatio* can also occur alongside the depiction of other simultaneous behaviors, such as self-masturbation by the *fellator*, mutual body fondling by both (or all) partners, and it can even be accompanied by penile-vaginal and penile-anal intercourse if enough performers are in the scene. Also, in cases involving three or more individuals in which at least two have penises, multiple penises can be *fellated* simultaneously (i.e., "double-barrel" *fellatio*). Angles are also important, as *fellatio* can be portrayed from the point-of-view (POV) of a person who performs the act, from the POV of the person who receives the act, or from the POV of a third-party. Independent of the POV, the explicitness of the act can range from clear detail of a mouth engulfing the penis to an occluded or partial view, as is typically done in mainstream Hollywood depictions, where an intervening body part, deep shadow, or piece of furniture is used to hide some, most, or all of the graphic details (e.g., one partner's head "bobbing" in the genital region of another). Beyond these technical aspects, depictions of fellatio can vary in the social dynamics that are portrayed: often, *fellatio* is depicted with a receiving male in a *superior* position (e.g., standing) while the female f*ellator* performs in an *inferior* position (e.g., kneeling), which is said to connote the message that women are – or should be – sexually subservient to men (Cowan & Campbell, 1994). However, depictions of mutual oral-genital stimulation (i.e., "69") also occur, and such materials likely convey more egalitarian relationships. *Fellatio* can also vary in its extent of violence, from consensually nonviolent "deepthroating" to consensual and non-consensual "throat fucking," which can block a *fellator*'s airway and cause them to choke and gag. Finally, *fellatio* sometimes, but not always, ends in orgasm, and when it does, the accompanying ejaculation can occur internally in a *fellator*'s mouth, externally on their face and/or their body, or externally on the recipient's body (or some combination of these locations). As should be apparent from this example, even two "similar" acts in pornography can vary in their specific presentations.

Critically, content differences in pornography matter. Foundational psychological theories over the past six decades assert that unique human responses are tied to the specific nature of preceding social stimuli (see, for example, Social Cognitive Theory, Bandura, 1986; Observational Learning Theory, Bandura & Walters, 1963; Theory of Reasoned Action, Fishbein & Ajzen, 1975; Social Learning Theory, Rotter, 1954; Excitation Transfer, Zillmann, 1983) and such stimuli include exposure to sexual media content. Further, contemporary media effects theories continue to alert us to the significance of the content of pornography for predicting and understanding its effects (see Leonhardt, Spencer, Butler, & Theobald, 2018; Wright & Tokunaga, 2016). In accord with these conceptualizations, the social models and behavioral stories that are portrayed in pornography can teach potential patterns of sexual behavior (Bandura & Walters, 1963), incentivize or de-incentivize performance of modeled behavior via exposition of the outcomes of such behavior (Bandura, 1986), contribute to the formation of attitudes and subjective norms toward the actions portrayed in sexually explicit stimuli (Davis & Bauserman, 1993; Fishbein & Ajzen, 1975), and influence one's standards and expectations concerning bodies and sexual activities (Fisher & Barak, 2001). The overlap of the content of sexually explicit materials with one's private and idiosyncratic sexual fantasies is also thought to be an important factor for the elicitation of sexual arousal (Mosher, 1988). In addition, the fit or lack of fit between the content of sexually explicit material and one's sexual standards is theorized to determine one's affective responses to such material (Byrne, 1976). Content, in a word, is king: it is believed to influence learning, inclination to enact, attitudes about actions, perceived norms, arousal, affect, and sexual standards and expectations[4].

Historically, research concerning pornography has attended to a number of different aspects of the content of such material, often responding to the cultural zeitgeist of the time. When early sexual response research indicated that pornography triggered similar levels of sexual arousal in men and women, content-specific hypotheses related to gender roles were advanced. It was argued that women were responding to the romantic aspects of pornography, while men were responding to the anatomical details, an assertion that was soundly rejected by empirical evidence (Fisher & Byrne, 1978; Heiman, 1977). Later research found that sexual arousal increased in both men and women when exposed to romantic themes as well as explicit sexual cues (Quackenbush, Strassberg, & Turner, 1995). Attempts to understand the specific content cues of pornography that trigger sexual arousal responses in men and women have continued to this day, and it is now believed that such responses are more strongly linked to exposure to preferred sexual targets in men (e.g., female targets for gynophilic men and male targets for androphilic men) than in women (Chivers, Seto, & Blanchard, 2007; Huberman, Maracle, & Chivers, 2014).

In response to broad concerns about sexual violence against women, the pornography research zeitgeist shifted attention to the sexually violent content of some pornography in the 1970s and 1980s (Donnerstein & Berkowitz, 1981; Malamuth, Heim, & Feshbach, 1980; U.S. Department of Justice, 1986). Plausible hypotheses posited that exposure to sexual media violence would teach potential patterns of sexually violent behavior, incentivize such behavior, create attitudes approving of such behavior, and/or condition sexual

[4]However, as Fisher and Barak (2001) have cautioned, it is critical to avoid over-crediting the potential impact of intermittent contact with pornography and to avoid "monkey see, monkey do" assumptions about effects of pornography. As these authors noted, the monkey has a brain – an extensive learning history signaling what actions are likely to be acceptable and what is likely to be punished and guilt inducing. Such learning histories accrue over a lifetime of frequent social interactions with others and should heavily influence the effects of comparatively intermittent exposure to pornography.

arousal and positive affect to sexual violence. Early research concerning these hypotheses could fill volumes of contested findings (Donnerstein, Linz, & Penrod, 1987; Fisher & Barak, 1991; Fisher & Grenier, 1994; Malamuth & Donnerstein, 1984). Notably for this discussion, some research indicates support for the notion that exposure to sexually violent pornography is more strongly associated with rape-supportive attitudes (Garcia, 1986; Hald, Malamuth, & Yuen, 2010) and self-reported sexual aggression (Ybarra et al., 2011; Ybarra & Thompson, 2018) than is exposure to nonviolent pornography, though causal direction is not always easy to infer from this literature.

If content, according to theory, is crucial for understanding the specific effects of pornography, why are results sometimes inconsistent with respect to exposure to violent compared to nonviolent pornography (see Wright, Tokunaga, & Kraus, 2016)? Beyond very specific methodological issues and failures to replicate (Fisher & Grenier, 1994; Malamuth & Ceniti, 1986), conceptual definitions of degrading and violent content have also proven to be difficult to articulate (Fisher & Barak, 2001; Gunter, 2001; McKee, 2015) and specific definitions of such constructs have not been widely adopted by the field. In part, this may have occurred because concepts like "violence" and "degradation" may have fuzzy boundaries, much like the concept of pornography (Kohut, 2014). As a consequence, it is not always clear if specific examples of content fit within these categories in theoretically meaningful ways. Do depictions of consensual spanking, for example, fit within the conceptual space of "sexual violence" or "sexual degradation" in theoretically meaningful ways? Within the domain of potential anti-women outcomes, there are dozens – if not hundreds – of specific content features that may theoretically contribute to such effects, but at present, we do not always know which of these elements users of pornography are actually attending to,[5] nor the degree to which exposure to such features actually influences anti-women outcomes. Moreover, researchers have generally neglected to account for differences in the preexisting characteristics of those who choose to use violent pornography compared to those that do not, sometimes even when they acknowledge that such characteristics exist and are influential (Bogaert, 2001; Malamuth, Addison, & Koss, 2000). Much like the case with pornography use more generally, the assessment of specific types of pornography is often not guided by well-articulated theoretically and empirically justified conceptual definitions.

Typologies of Pornography Content

Some efforts have been made to organize the realm of pornographic media into specific conceptual typologies based on the content that is depicted. One early typology identified by the Attorney General's Commission on Pornography in the 1980s divided pornography into five categories: (1) sexually violent materials; (2) nonviolent sexually degrading materials; (3) nonviolent and non-degrading materials; (4) materials depicting nudity with no sexual behavior; and (5) sexual materials involving minors (Gunter, 2001). This approach was a variant of other tripartite typologies that were popular during this period (e.g., violent pornography vs. degrading/mainstream pornography vs. erotica/idealized sexual themes see, Check & Guloien, 1989; Weaver, 1994) but was more exhaustive in that it also included depictions of nudity in the absence of sexual behavior as well as a consideration of child pornography. A more recent typology was proposed by Leonhardt et al. (2018) which differentiated between sexually suggestive media, sexually explicit media (i.e., involving explicit depictions of sexual behavior), and paraphilic media (involving depictions of dominance, coercion, or fetishes). In general, these typologies seek to differentiate pornographic media in terms of their degree of sexual behavior and their depiction of antisocial content, though many other ways of dividing this conceptual territory are possible.

Existing typologies of the content of pornography represent relatively coarse efforts to organize such media (Hald & Štulhofer, 2016b; Kohut & Campbell, 2019). In the process, they homogenize a great deal of variation across pornographic media, and at best, such divisions can only speak to fundamental overarching content features and scripts. We have previously expressed doubt that complex sexual stimuli can be reliably organized into such categories, pointed out that consumers may not perceive the content of such materials in ways that are consistent with the theoretical divisions that have been proposed, and challenged the empirical validity of specific assertions that have been made about the scripts contained within some of these categories (Fisher & Barak, 2001; Kohut & Campbell, 2019). Further, as existing content-typologies have sought to distinguish between anti-social content and content that is free of such characteristics (e.g., nonviolent non-degrading content, erotica, idealized sexualized themes), they appear to reflect, and will likely perpetuate, a general "harm focus" that is common in pornography research (Campbell & Kohut, 2017). Empirical researchers have yet to propose typologies that consider "prosocial" content, despite the fact that features such as female climax and clitoral stimulation are portrayed in some pornography (Fritz & Paul, 2017), and exposure to such materials has the potential to increase female sexual pleasure through modeling (Kohut & Fisher, 2013). At the same time, we acknowledge that theoretical and practical reasons may exist to narrowly study the relationship of personal characteristics, choice of specific pornographic content, such as sexually violent content, and correlates or effects of such content.

More recently, some data-driven approaches to divide pornography into distinct content categories have also emerged. One such study asked participants to indicate how often they viewed eight types of sexual media and found through confirmatory factor analysis that responses were best represented by a two factor structure that distinguished between the use of "sexually provocative media" (e.g., "An image of a woman alone posing in a suggestive way with underwear on") and the use of "pornography" (e.g., "An image of a heterosexual couple having sex which shows the man's penis penetrating the

[5]We note that there is an emerging literature that uses eye-tracking equipment to examine what people attend to when they look at sexual imagery (Wenzlaff, Briken, & Dekker, 2016). Our point here is not to overlook such research, but to suggest that there is simply not enough studies of this sort to fully inform our theoretical understanding of specific conceptual definitions of sexually violent pornography.

woman") (Leonhardt & Willoughby, 2019). In another approach, researchers conducted an exploratory factor analysis on pornography users' self-reported arousal to 27 types of pornographic content (e.g., anal sex, masturbation, Lolita/teen, etc.) that were pre-selected by the authors (Hald & Štulhofer, 2016b, 2016a). In this case, the resulting factor structures differed somewhat by gender and sexual orientation, but three categories of content emerged across various subsets of participants: group sex (e.g., gang-bang, orgy, threesome, etc.); non-heterosexual sex (e.g., gay, lesbian, bisexual, etc.); and non-mainstream paraphilic content (e.g., sadomasochism, bondage, violent sex, etc.).

Such approaches for identifying content categories of pornography represent an empirically-driven alternative to theoretically-driven conceptual divisions that have been proposed. While interesting, such approaches are not free from criticism either. At present, the results of such studies still offer relatively broad categories of pornographic content. This may simply be the product of analyses that focus on a relatively superficial treatment of content variation in pornography. For example, even though Hald and Štulhofer (2016b) based their analysis on 27 types of pornography, modern indexes of freely accessible pornography differentiate between over one hundred (see https://www.pornhub.com/categories) or even several thousand types of content (see https://xhamster.com/categories). The decision to analyze participants' content-related behavior and anticipated reactions in these studies is also important to consider. From their methodology, it would seem that the results of Leonhardt and Willoughby (2019) reflect divisions in participants' intentional exposure behavior, while the results of Hald and Štulhofer (2016b, 2016a) reflect the clustering of participants' perceived sexual arousal responses. It is not apparent that such approaches would ever converge on a similar taxonomic solution, nor is it clear if either approach reflects the "natural" co-occurrence of specific content features in pornography. In other words, such approaches might be better suited to organizing specific reactions to pornography (e.g., people who like A also tend to like B) rather than pornography itself (e.g., pornography featuring A also generally features B). Lastly, as methods that are unwed to specific theory, empirically-derived content categories of pornography may or may not identify classes of pornography that are relevant for understanding antecedents, correlates, and effects of exposure. In an extreme example, a thorough empirical analysis of content differences may indicate that hair color of female performers may be a reliable dimension of variation in pornography, but distinguishing between consumers that seek out pornography featuring blondes rather than brunettes will probably not inform our understanding of pornography's role in sexual violence.

Conclusions about the Measurement of the Specific Content of Pornography

A great deal of work still needs to be done to understand how best to differentiate the content of pornography. Most studies that are sensitive to content-differences in pornography implement *ad-hoc* measures (Hald & Štulhofer, 2016b) without recourse to standardized conceptualizations of such constructs, which once again makes it difficult to compare results across studies. Specific conceptualizations of certain types of content have been proposed (e.g., violent pornography), both as a part of (Check & Guloien, 1989; Weaver, 1994), and separate from (McKee, 2015), broader typological frameworks that have sought to divide the entire domain of pornographic materials. The merits of some of these conceptualizations have been challenged (Fisher & Barak, 2001; Gunter, 2001; Kohut & Campbell, 2019), and the sufficiency of others has yet to be demonstrated. What are needed at this juncture are systematic programs of research that seek to identify and describe psychologically meaningful content categories. As with the nature of pornography itself, such efforts should be informed by both theoretical and empirical considerations. Until such efforts are undertaken, the proliferation of idiosyncratic unvalidated measures of content-specific aspects of pornography use is likely to continue.

Issues to Consider When Developing New Measures of Pornography Use

Steps to scale development are relatively straightforward (Flake et al., 2017; Gadermann, Guhn, Zumbo, & Columbia, 2012; Gehlbach & Brinkworth, 2011; Maul, 2017; Simms, 2008) but require careful consideration of the definitional and content issues we have discussed. Researchers who are seeking to develop new measures of pornography use should identify a variety of plausible indicators that reflect a well-articulated conceptual definition of pornography use (the complexities of which we have exhaustively discussed), refine the item-pool by using appropriate item selection procedures, determine whether the items best reflect categorical or continuous latent dimensions, employ procedures to examine their dimensional structure, establish measurement invariance, and gather evidence of the resulting scale's validity and reliability (Flake et al., 2017; Gehlbach & Brinkworth, 2011; Sakaluk, 2019).

Although we generally believe that the field should adopt a more limited set of standardized measurement practices, we also recognize that specific operational definitions may be most appropriate for specific theoretical applications. If, for example, one had reason to believe that pornography use impairs academic performance by displacing the time that some students spend studying, it may be more important to measure the amount of time that students spend using pornography rather than the frequency with which they use it. Alternatively, if one argued that scripts of non-consensual violence contribute to the enactment of sexual aggression, then measuring use of such materials (as well as the characteristics that may motivate its use) would provide a better test of this theoretical proposition than measuring use of consensually nonviolent materials, or general use of pornography. Finally, if one was interested in the roles of inhibitory control and self-presentation concerns in pornography-induced negative life events such as accusations of sexual harassment, job termination, or divorce, specific measures of public pornography use, pornography use in the workplace, and secretive-solitary as compared to shared pornography use may be particularly applicable. In brief, there may not be a one-size-fits-all solution that works equally well across various research programs.

Our position on this issue may seem inconsistent to some. If having too many measures of pornography use is a problem for the field, how can we justify the development and validation of multiple new measures of pornography use? To clarify this point, we would like to remind the reader that most of the measures discussed in this review have been idiosyncratically designed by diverse research groups with minimal attention paid to best practices in construct validation or scale development (our own measures included). Many of these measures appear to be hastily compiled products of imminent need rather than carefully developed tools. These events have led to a paradoxical situation of sorts, wherein the measurement of pornography use can be characterized by a proliferation of measures and an absence of clearly useful measures. In this context, we believe that the field would benefit if researchers abandoned *ad hoc* idiosyncratic measures of pornography use in favor of a smaller number of standardized assessment tools that have been carefully developed and validated. To this end, we propose that researchers who are considering new measures of pornography use and related behaviors seek to answer the following questions before development:

(1) What is the theoretical basis for this measure?
(2) Is a new measure necessary?
(3) How can this measure be validated?
(4) How does one obtain evidence of reliability?

Of utmost importance, any new measure of pornography use behaviors should first seek to establish a clear theoretical basis for the work. That is, what is the conceptual basis of such a new measure, and what questions does the new measure seek to answer? The proliferation of redundant measures that poorly measure purported constructs of interest extends far beyond the measurement of pornography-related constructs (Flake & Fried, 2019; Fried et al., 2016; Maul, 2017). Indeed, these issues of measurement extend into social, personality, and clinical psychology more generally. At a foundational level, many of the reasons for these measurement problems are fundamentally attributable to weak theoretical underpinnings for new measurements (Gehlbach & Brinkworth, 2011; Maul, 2017; Simms, 2008). For this reason we sought to provide a broad and inclusive conceptual definition of pornography use while highlighting the role of various facets of pornography use as well as challenges in the conceptualization of the use of specific pornographic content. It is now up to the field to apply this definition, or propose alternatives, and seek to develop more specific definitions of the various facets of use (e.g., self-exposure vs. pornography seeking, creation, exchange, or storage), as well as definitions of the use of specific types of pornography (e.g., violent, feminist, prosocial, etc.), to guide the creation and refinement of further measures of pornography use in survey research.

As a starting point, for those seeking inspiration for a measure of voluntary self-exposure to pornography that is neither content nor source specific, we suggest the following guiding definition:

> Using pornography means to intentionally look at, read, or listen to: (a) pictures, videos, or films that depict nude individuals or people having sex; or (b) written or audio material that describes nude individuals, or people having sex. Using pornography does not involve viewing or interacting with actual, live, nude individuals, or participating in interactive sexual experiences with other human beings in person or online. For example, participating in live sex chat or a camshow, and getting a "lapdance" in a strip club are not considered pornography use.

Those who wish to design single- or multi-item measures that ask respondents directly about their "pornography use" should provide this definition to participants. This practice would help ensure that all participants in a given sample are reflecting on the same behaviors, it would reduce discrepancies between participants' understanding of pornography use and the understanding held by researchers, and it would help to standardize assessment procedures across studies. Alternatively, researchers who wish to design more indirect measures of pornography use (e.g., How often do you look at, read, or listen to, … pictures of celebrity nip-slips? … written material involving anal sex? … videos with genital close-ups?, etc.) could use this more specific definition of pornography use to inspire more comprehensive item generation than has been true in the past. Which of these two approaches would provide the most valid assessment of intentional self-exposure to pornography remains an important but unanswered empirical question. Secondary to the development of a clear theoretical basis and rationale for a new measure, we encourage researchers to carefully evaluate whether or not there is an actual need for a new measure. More simply, is this new measure truly necessary? In our review of the literature, we emphasize how measures of pornography use differed across studies, but we also found numerous examples of potentially redundant measures of pornography use (e.g., Would a measure that inquires about the use of pornography over the past year differ markedly from a similarly worded measure about use in the last 6 months?). As such, in some cases, creating new pornography use measures may risk duplicating existing measures. Of course, if existing measures are biased, poorly validated, or seriously flawed, then such limitations can be part of a compelling rationale to create and validate a new measure. However, clear and compelling documentation of the limitations of existing measures should be necessary before proposing new measures.

Beyond establishing a clear theoretical basis for a new measure and a demonstrated need for such a measure, an important third important question to consider before developing a new measure is related to its validation. That is, by what means can a new measure be validated? Critically, we feel that indications of face validity, structural validity, and even convergent/divergent validity are not in themselves sufficient evidence that self-reported measures of pornography use accurately reflect pornography use behavior. As we mentioned before, recent research in the areas of Internet and smartphone use has concluded that the accuracy of self-report measures of such behaviors is low (Ellis et al., 2018; Scharkow, 2016). Further, systematic deviations have been noted when self-reported Internet use has been compared to log information (e.g., inflation; Scharkow, 2016), and when self-reported pornography use is assessed under conditions of anonymity

(e.g., deflation; Alexander & Fisher, 2003), and conditions that imply acceptance of such behavior (e.g., inflation; Peter & Valkenburg, 2011a). Taking a cue from such findings, it is apparent to us that researchers should also consider how well self-report measures of pornography use compare to objective records of such behavior (e.g., movie rentals, pay-per-view records, browser logs, account logs for members of pornographic websites, etc.) and carefully examine the possibility of nonrandom biases in self-reports of this behavior. Validation work can also employ free- or forced-choice paradigms (Frable et al., 1997) in which participants can decide to view or avoid sexual stimuli in the course of the study's procedure (see, for example, Bogaert, 2001). In this case, criterion validity would be demonstrated if the measure of self-reported pornography use predicted participant decisions with a high degree of accuracy. In an ideal program of work, validation should be ongoing and should involve a careful, preregistered, in-depth plan, incorporating measures of theoretical interest, behaviors of practical relevance, and appropriate analytic strategies for demonstrating the validity and the generalization of validity across diverse participant samples.

Finally, as is the case with all measure development efforts, careful attention needs to be paid to issues of reliability. Psychological measurement has historically neglected, abused, and misinterpreted reliability (Gadermann et al., 2012; McNeish, 2018; Vaske, Beaman, & Sponarski, 2017). For example, a preponderance of articles in social and personality psychology have either explicitly or implicitly used Cronbach's Alpha as an indicator of unidimensionality (Flake et al., 2017), even though internal consistency is distinct, both in theory and practice, from unidimensionality (McNeish, 2018). Fully explicating the different definitions and forms of reliability is beyond the scope of the present work. However, much like our previous discussion of validity, future researchers seeking to develop new measures of pornography use and related behaviors need to carefully consider what reliability means in relation to their specific research questions and the specific analytic strategies they intend on using to document such reliability.

The four considerations above are not meant as a comprehensive guidebook for the development of new measures, though such guides do exist for psychosocial research more generally (see Flake et al., 2017; Gadermann et al., 2012; Gehlbach & Brinkworth, 2011; Maul, 2017; Simms, 2008). Rather, we believe these are key considerations that should underlie current and future efforts to develop measures that are useful and accurate in the assessment of pornography use, rather than simply convenient or easy.

Conclusion

As in many other areas of study, it is clear that poor measurement practices have proliferated in the field of pornography research. The extent of inconsistent conceptual and operational definitions of pornography use across studies coupled with the lack of properly validated instruments for measuring this construct is troubling to us and is impeding progress in this area. We are far from the only voices to raise these concerns, but as of yet, little has been done to rectify the issues. It is our sincere hope that this review will encourage our colleagues to think more carefully about what pornography use means so that the field can move toward more standardized assessment practices with a smaller number of well-validated instruments. Until we do, research in this area will continue to produce inconsistent findings of uncertain legitimacy.

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