## Owning leads to valuing: Meta-analysis of the Mere Ownership Effect

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#### Abstract

Mere ownership effect is the phenomenon that people tend to value what they own more than what they do not own. This classic effect is considered robust, yet effect sizes vary across studies, and the effect is often confused for or confounded with other classic phenomena, such as endowment or mere exposure effects. We conducted a pre-registered meta-analysis of 26 samples published before 2019 (N = 3024), that resulted in psychological ownership on valuing effect of  $g \sim 0.55$  [0.43, 0.66]. Suggestive moderator analyses supported the use of replica and valuing type as the strongest moderators. Mere ownership effects were different from the null across all moderator categories and in most publication bias adjustments. We consider this as suggestive evidence that psychological owning leads to valuing, yet caution that much more research is needed. All materials, data, and code are available on https://osf.io/fdyqw/

Keywords: ownership; mere ownership effect; meta-analysis; psychological ownership; valuing

#### Owning leads to valuing:

#### Meta-analysis of the Mere Ownership Effect

One of the authors recently offered candies to his children, one chocolate and one strawberry flavored. Although the children received candies that were not in line with their stated preferences, they refused to trade the candies. This is an illustration of the mere ownership effect: people generally hold more positive evaluations (e.g., set higher prices) or exhibit stronger liking towards an owned object, relative to an object that is not owned (e.g., Barone, Shimp, & Sprott, 1997; Beggan, 1992; De Dreu & van Knippenberg, 2005; Morewedge et al., 2009; Peck & Shu, 2009).

A core element of the mere ownership effect is psychological ownership, the perception that an object is owned by oneself, representing a perceived association between an individual and an object (Heider, 1958). Once an association is formed, the object is then perceived to be associated with the self and may therefore carry attributes related to one's definition of the self (Belk, 1988). As people tend to perceive themselves in a more positive way than how they perceive others (Taylor, 1989), this tendency often extends to self-associated objects, resulting in more favorable evaluations of owned objects relative to not-owned objects (Beggan, 1992). Ownership has been shown to be relevant to the understanding of the psychological underpinnings of legal and moral rules guiding our social environment with most prominent examples of exchange and trade (Nancekivell, Friedman, & Gelman, 2019). Keeping track of ownership is even considered by some to be a reason as to why writing and numbers were developed (Schmandt-Besserat, 1986).

4

In this project we were interested in examining the mere ownership effect, estimating its effect size, and testing potential boundary conditions. To this end we present a meta-analysis of the mere ownership effect, and consider several potential moderators, including the type of objects (actual vs. replica; material vs. immaterial object), type of ownership (legal vs. no clear legal ownership; implicit vs. explicit ownership; same vs. different exposure), consequences of owning an object (potential loss vs. no potential loss), experimental design choices (between-subjects vs. within-subjects design), and measurement category (evaluation vs. price).

We begin by reviewing the literature on the mere ownership effect, defining the scope of our review of the phenomenon, discussing the importance of the effect and how it relates to and differs from other similar psychological constructs. We then report a pre-registered meta-analysis and discuss findings and implications.

#### Mere Ownership Effect

The mere ownership effect is the phenomenon that people tend to value what they perceive to own more than what they perceive not to own. An experimental illustration of this effect was first presented by Beggan (1992). Participants in one of his experiments were presented with cold drink insulators and eight other objects. Next, they were asked to judge the attractiveness of all products. Some of the participants were promised to receive the insulator as a gift, whereas others would either receive an object of similar value or receive nothing. The ratings of the insulator differed across the three groups. Participants that were promised to receive to receive the insulator to participants in the other two groups. Hence, the conclusion was that people liked the promised object more because they perceived it as already being theirs.

Why does the mere ownership effect occur? There are several suggested accounts. From an evolutionary perspective, people may like objects that they own more because this may help them trade with greater profit margins, thus giving them an advantage over individuals who would not attach greater value to owned objects and would therefore not convincingly bargain for higher prices (Huck, Kirchsteiger, & Oechssler, 2005). Individuals that are more strongly subject to the mere ownership effect may be able to acquire more resources in trading compared to those less prone to the effect, hence being in a better position to have more offspring and better support them, thereby having an advantage in transmitting their genes to the next generation. The preference for one's own possessions has been observed in early stages of life, as young as two-to-three years old children (Gelman, Manczak, & Noles, 2012), which may indicate that this tendency is hardwired into human cognition.

Greater valuation of owned objects may also emerge because, compared to objects that are not owned, features of owned objects seem more cognitively readily available (Johnson, Häubl, & Keinan, 2007), and these tend to be price-increasing positive features (reliable, wellmaintained, etc.) (Ashby, Dickert, & Glöckner, 2012). In comparison, when people consider potential purchases, evaluating something they do not yet own, they tend to think about pricedecreasing features first (such as weaknesses, risks, potential failures and break-downs). Therefore, the subjective value of an object depends on the features that one thinks about and considers which in turn depend on ownership and perspective (Johnson, Häubl, & Keinan, 2007).

#### Mere Ownership and Endowment Effects: Loss Aversion

In the economics literature, changes in valuations of owned objects in a transaction were labelled as an endowment effect (Thaler, 1980; Marzilli Ericson & Fuster, 2014). For example, Korobkin (2003) defines the endowment effect as a case when "people tend to value goods more when they own them than when they do not" (pp. 1228). The phenomenon is often demonstrated by comparing willingness to accept (WTA) to willingness to pay (WTP) in a situation of buying and/or selling (Knetsch, 1989; Franciosi, et al., 1996).

Thaler (2015) illustrated the endowment effect by describing the endowment behavior of a friend who collected wine. This friend only bought relatively inexpensive wine (up to \$30). After some time, some of the wine collected became much more expensive with prices reaching over \$100. The friend refused to sell his wine for the high market price, and at the same time refused to buy similar wine for this much. Thaler concluded that the wine was simultaneously worth over and under \$100. Consistent with this observation, a meta-analysis of the endowment effect found that the WTA to WTP ratio is roughly 2.6, i.e., that the asking price is between double to triple the bidding price (Horowitz & McConnell, 2002).

One of the possible explanations for the endowment effect is that people react differently to gains and losses. In a phenomenon coined as "loss aversion", the negative affect experienced as a result of a loss is perceived to be stronger than the positive affect experienced as a result of an equivalent gain (Kahneman & Tversky, 1984; Tversky & Kahneman 1991). Sellers/owners perceive selling goods as a loss, and buyers/non-owners perceive buying an object as a gain (Thaler, 1980; Kim & Johnson, 2015; Knetsch, Tang and Thaler, 2001; Peck & Shu, 2009; Sen & Johnson, 1997). Since people are aversive to losses, sold goods seem to have greater value than bought goods (Tversky & Kahneman, 1991). Korobkin (2003) argued that on top of a "pure loss aversion" there is also an attachment to an object which results in discomfort with the idea of subjecting an object to a market transaction. Considering the above, it is possible that people set a higher price for an owned object in a transaction because they weigh the anticipated

#### Mere ownership effect: Meta-analysis

negative feelings of forgoing the object against the weaker positive feelings associated with potential monetary gains.

Another possible explanation for the endowment effect is the status quo bias: the preference for the status quo, all other things being equal (Samuelson & Zeckhauser, 1988). Sellers perceive owning the object as the familiar effortless status quo, and the departure from the object as an effortful somewhat uncertain change to the current state (Thaler, 1980; Brenner et al., 2007). Hence, the generalized biases of loss aversion and the status quo bias may jointly explain the endowment effect in transaction situations (Korobkin, 2006).

Despite similarities between the mere ownership effect and the endowment effect, the two effects are mostly studied in separate literatures, with little acknowledgment and cross-referencing. Whereas economics and marketing literatures mainly focused on the endowment effect (or WTA-WTP differences), the social, personality, and organizational psychology literatures mostly focused on mere ownership effect and psychological ownership. In several meta-analyses of WTA-WTP asymmetries (Sayman & Öncüler, 2005; Tunçel & Hammitt, 2014) there were no references to the mere ownership literature. When cross referencing occurred, mainly from the psychology literature, the endowment effect was considered an exemplar of the mere ownership effect (e.g., Reb & Connolly, 2007; Mandel, 2002).

The discussion regarding whether mere ownership effect or endowment effect is the central broader phenomenon is out of the scope of the current investigation. While there seems to be an overlap between the two, these can be also seen as theoretically distinct concepts. Both of these effects may also be related to or affected by the status quo bias. In our view, the critical point in distinguishing between the two concepts is regarding the impact of loss aversion, which seems more prominent in the endowment effect. Most of the endowment effect research focuses

8

#### Mere ownership effect: Meta-analysis

on trading and negotiations involving prices, clearly contrasting buying versus selling, thereby emphasizing aspects related to potential gains or losses (e.g., Walasek, Matthews, & Rakow, 2015; Morewedge et al., 2009). Loss aversion is considered important in endowment effects yet not essential for the mere ownership effect. For example, the ownership effect literature has demonstrated the effect for immaterial targets. Nuttin (1985, 1987), in what is considered one of the first demonstrations of the ownership effect, showed that people tend to like letters that appear in their names more than letters that do not appear in their names. Clearly, there is no prospect of "losing" a letter, and it is therefore implausible to perceive a threat of having to part from it. It also suggests a broader definition and conceptualization of "ownership" than factual legal ownership by an identifiable clear owner, as no one truly owns a letter of the alphabet, but rather perceives an association between oneself and that immaterial object. Loss aversion, therefore, cannot entirely account for the mere ownership effect and psychological ownership, yet is considered a plausible explanation of the endowment effect with the embedded threat of perceived loss.

We further discuss the similarities and differences between the two effects in the discussion section below, with suggestions for future research to address the need to integrate the two literatures and possibly disentangle the two phenomena.

#### **Meta-analysis of Mere Ownership Effect**

#### Aim

We embarked on a pre-registered meta-analysis aiming to examine the overall effects of mere ownership on evaluation and liking of the target object, and to identify possible moderators. We focused solely on experimental designs manipulating ownership as the independent variable, contrasting conditions of ownership versus no-ownership over an object. The dependent variables of interest were object valuations of pricing or liking. We expected to find support for the phenomenon that people hold more favorable evaluations or higher liking towards owned, relative to not-owned, objects.

#### Scope: Focusing on psychological ownership

We focused our meta-analysis exclusively on mere ownership effect, with the intention of separating it from endowment effect. We limited the scope in the meta-analysis pre-registration to studies that do not contrast buyers against sellers and/or WTP-WTA without explicitly involving psychological ownership. In other words, we excluded studies that only implied ownership by creating market transaction conditions. This way, we aimed to estimate the magnitude of the mere ownership effect beyond market transactions and to address possible confounds of psychological ownership with other processes, such as those related to trade and/or loss aversion.

We also decided to exclude experiments involving paradigms based on the name-letter effect (Nuttin, 1987), which demonstrated consequences of ownership on liking of name letters which were conceptualized as owned immaterial objects. Over the years, the name letter effect grew popular (e.g., Hoorens & Nuttin, 1993; Feys, 1995; Kitayama & Rarasawa, 1997) and has been adopted as one of the most common measures of implicit self-esteem (Buhrmester, Blanton, & Swann Jr, 2011; Hoorens, 2014). The name-letter paradigm has since been extended to other factors that might be associated with the self, such as birthday date numbers (Kitayama & Rarasawa, 1997; Nickell, Pederson, & Rossow, 2003). The idea of ownership in relation to targets like names and birthdays was challenged and reformulated with the argument that letters and date numbers are not truly chosen and are therefore not exclusively "owned" by a person. These are different from other material objects that can be possessed and exclusively owned, or from other immaterial objects such as articles and inventions that can be defined as persons' unique intellectual property. Although an individual may associate name letters or birthday date numbers with the self, it is unclear whether these associations at all entail psychological ownership. We believe it is unlikely to find persons thinking of or referring to letters in their names and numbers in their birthday dates as owned property. The name-letter effect includes many other aspects not only related to ownership, if ownership is indeed reflected in this effect. We therefore aimed to clearly differentiate between the two effects and excluded any articles of the name-letter or similar effects.

#### Moderators of the mere ownership effect

We identified several factors in the literature that may affect the magnitude of the mere ownership effect: duration of ownership, actual versus replica ownership, explicit versus implicit ownership, loss aversion, mere exposure, factual/legal ownership, and material versus immaterial object. All these processes were not assumed to explain the mere ownership entirely but have been shown to impact the magnitude of the effect or even its existence. We review these moderators below, discussing their theoretical significance and presenting some of the supporting evidence. We provide a summary of the hypotheses in Table 1

We note that we embarked on this meta-analysis expecting a substantial number of studies for each of the hypothesized moderators that would allow for conclusive evidence. However, we were surprised by the small number of studies, resulting in underpowered analyses, which should be regarded as suggestive rather than conclusive. We therefore recommend that readers regard our moderators as theoretical directions for the mere ownership literature with initial suggestive evidence. We return to this point in our discussion of the results.

### Table 1

## Hypotheses, findings in the literature, and meta-analysis findings

Hypotheses	Main findings in the literature	Meta-analysis findings		
Main hypothesis				
Psychological ownership of an object increases evaluation/liking of that object.	Ownership increases the evaluation/ liking of the object (Beggan, 1992).	Supported		
Moderator hypotheses				
Loss potential: 1. The impact of ownership on valuation/liking is different from null (null not included in confidence intervals) regardless of loss aversion.	Mere ownership effect is not due to loss aversion (Morewedge, Shu, Gilbert, & Wilson, 2009).	Supported		
2. The impact of ownership on valuation/liking is stronger with potential loss.		Partially supported		
Mere exposure:				
1. Impact of ownership on valuation/liking is different from null (null not included in confidence intervals) regardless of mere exposure	Mere ownership effect occurs not due to mere exposure (Beggan, 1992; Horrens & Nuttin, 1993).	Supported		
<ol> <li>Impact of ownership on valuation/liking is stronger with same exposure than different exposure.</li> </ol>	Mere ownership effect is not different between different exposures (Horrens & Nuttin 1993; Beggan, 1992).	Not supported		
Duration of ownership:				
The impact of ownership on valuation/liking is stronger in long compared to short ownership duration.	Longer duration of ownership can enhance the mere ownership effect (Strahilevitz & Loewenstein, 1998; Peck & Shu, 2011).	Not supported. Insufficient variation in experiments		

Hypotheses	Main findings in the literature	Meta-analysis findings		
Actual vs. replica ownership:				
Impact of ownership on valuation/liking is stronger when object is owned compared to when the object is similar to an owned object or a replica.	No experiments comparing ownership on actual versus replica ownership.	Supported		
Material vs. immaterial objects:				
1. Impact of ownership on valuation/liking is stronger for material objects (compared to immaterial).	No experiments comparing ownership on material versus immaterial objects <sup>1</sup> .	Not supported		
2. Impact of ownership on valuation/liking is stronger for immaterial objects.		Not supported		
Factual versus implied ownership				
Impact of ownership on valuation/liking is stronger for legally owned objects (compared to no clear indication of legal ownership).	Legal ownership strengthens psychological ownership (Pierce, Kostova, & Dirks, 2003)	Not supported		
Explicit vs. implicit ownership:				
The impact of ownership on valuation/liking is stronger when ownership is explicit compared to implicit.	No experiments comparing explicit versus implicit ownership.	Not supported		

#### Potential for loss

Loss aversion has been used to explain the valuation of goods in market operations like

selling an owned object and the endowment effect, as we discussed in the introduction. Yet, the

<sup>&</sup>lt;sup>1</sup> A recent paper, published several years after the data have been collected for this project, compared ownership effects in material to in immaterial objects, finding no differences between the two (Stefanczyk et al., 2021)

potential for loss may also affect ownership without involving trade. For example, losing a good set of arguments when writing an argumentative essay could be perceived as a loss because it may decrease chances to win the upcoming debate (De Dreu & van Knippenberg, 2005). Some mere ownership experiments explicitly mention the possibility of parting with an owned object, whereas some other do not. It is possible that the mentioning of potentially having to part with an object activates some form of loss aversion, which in turn changes valuation. We therefore sought to examine whether the mention of the possibility of not owning an object will moderate mere ownership effects. This potential of loss is not to be confounded with loss aversion resulting from deliberately trading (e.g., selling) an object.

We entertained two competing hypotheses regarding the moderating role of potential of loss on mere ownership effect. Chatterjee, Irmak, and Rose (2013) found that when the object was perceived as part of the self, parting from that object became threatening and led to stronger mere ownership effect. Accordingly, we predicted that mere ownership effects would be stronger when there was potential for loss compared to when there was no potential for loss. Yet, it is possible that ownership alone is sufficient to induce positive evaluation or liking of the owned object (Morewedge et al., 2009).

#### Mere exposure and duration of the ownership

Mere ownership effect may be driven by or associated with the mere exposure effect: the phenomenon that mere repeated exposure to an object, regardless of its ownership status, enhances favorable evaluations of the object (Zajonc, 1968). Repeated exposure to an object increases the ease by which information is processed (perceptual fluency), which in turn increases positive affect (Bornstein & D'Agostino, 1994). Since ownership often involves more exposure to the owned object, it is unclear whether or to what extent mere ownership effect is

accounted by mere exposure (Beggan, 1992). If mere exposure affects ownership, it would be expected that more exposure (i.e., over longer period of time) would increase the strength of the mere ownership effect.

There have been mixed views regarding whether the duration of ownership is a factor in the mere ownership effect. On the one hand, Strahilevitz and Loewenstein (1998) suggested that people tend to value an object more immediately after owning it, though they argued it may take some time for a full sense of ownership to develop and reach maximal impact. They demonstrated that favorable evaluations of an owned object increased the longer the ownership lasted, and this has been successfully replicated in subsequent studies (e.g., Shu & Peck, 2011). On the other hand, some studies found that mere ownership effects occur even before the ownership has been clearly defined (Peck & Shu, 2009).

The duration of ownership varies across existing studies. In some studies, participants rated an object given to them in the experiment (e.g., Beggan, 1992), whereas in other studies, participants evaluated an object that has been owned for a long period of time (e.g., Nesselroade, Beggan, & Allison, 1999). It is therefore unclear whether the duration of exposure critically contributes to the mere ownership effect, amplifies it, or is simply an unrelated factor. We predicted that the duration of ownership is positively related to mere ownership effects, such that the mere ownership effects would be stronger the longer the duration of ownership.

#### Actual versus replica ownership

Would a simulation of ownership have the same effect as actual ownership? In actual ownership, the evaluated object is owned by the individual, whereas in replica ownership, the evaluated object is a replica - an object similar to the one owned. Past research suggested that replicas may trigger weaker mere ownership effects than actual objects did. For example, Barone et al. (1997) conducted a replication of Beggan's studies (1992), observing much smaller effect size compared to that of original experiments. Later, Beggan and Allison (1997) conducted a mini meta-analysis of their studies and concluded that Barone et al. (1997) manipulated ownership by asking participants to evaluate a replica, which appeared to be a crucial departure from Beggan's (1992) manipulation in which the actual owned object was used. Beggan and Allison (1997) argued that the weakened effects could perhaps be explained by participants' weaker or lacking attachment to the replica, compared to an object that is factually owned. Thus, we predicted that mere ownership effects would be stronger when the target object is owned compared to when the target object is a replica.

#### Material versus immaterial object

Does ownership have the same effects for material and immaterial objects? The mere ownership effect has been demonstrated on both material objects such as insulators and mugs (e.g., Barone et al., 1997; Morewedge et al., 2009), and immaterial objects, such as arguments (De Dreu & van Knippenberg, 2005), letters (Nuttin, 1987), symbols (Feys, 1991), and time (Hoorens, Remmers, & van de Riet, 1999). We therefore explored the moderating effect of material versus immaterial objects.

#### Factual versus implied ownership

Factual ownership, in contrast to implied ownership, requires the presence of actual ownership. Ownership can be induced by offering an object to participants or by a clear declaration that ownership has taken place (Barone, Shimp, & Sprott, 1997; Beggan, 1992; Morewedge, Shu, Gilbert, & Wilson). In these cases, the possession is considered factual, and the person is then considered the clear owner, with legal implications. In contrast, ownership can also be implied or inferred indirectly. Implied ownership is a feeling of ownership to objects that are not factually owned. For example, in a simulated police investigation self-collected clues were perceived as more informative than objectively equally informative clues collected by colleagues (Toma, Bry, & Butera, 2013). Similarly, individuals who had the opportunity to touch an object perceived an object as subjectively "more owned" and also as worth more (Peck & Shu, 2009). Because the touched object was explicitly offered to be sold to participants, mere opportunity to touch it had no impact on its real ownership status.

It seems that both factual and implied ownership can induce mere ownership effects, yet factual ownership may induce stronger sense of ownership than implied ownership. Therefore, we predicted that the mere ownership effects would be stronger when the ownership is factual relative to implied.

#### Explicit versus implicit mentioning of ownership

Some experimental evidence suggests that the mere ownership effect can be caused merely by an indirect suggestion that an item is owned. Such effect is however weaker compared to stronger effects if the ownership is made explicit. This is likely connected to the strength of the stimuli intended to drive a response, with subtle cures being less likely to trigger corresponding behavior or more likely to trigger weaker responses compared to more salient cues (Carpenter, 2009). To illustrate, in the seminal Beggan (1992) experiment, participants were explicitly instructed that once the study concludes the evaluated item will be theirs. In contrast, Peck and Shu (2009) asked participants to touch an object, this way allowing participants to assume some sort of ownership. Similarly to Peck and Shu (2009), Toma et al., (2013) invited participants to a simulated investigation and provided them with unique sets of clues that only all combined produced the correct solution. Despite the fact that the ownership over the clues was never made explicit, participants still found "their" clues more important compared to "other's" clues.

This explicit vs implicit mentioning of ownership should not be confounded with legal status of the ownership, because the former only refers to how the ownership status of an object has been communicated to participants. Implicit ownership in which ownership is not clearly stated is weaker than explicit ownership which is clearly defined. We expected weaker mere ownership effects in implicit compared to explicit ownership studies.

#### Exploratory methodological moderators

We examined additional moderators regarding methods. We explored whether particular choices regarding the design of experiments could affect the observed strength of the mere ownership effect.

#### Between-subject versus within-subject experimental design

When evaluating several items in within-subject designs, people tend to make comparisons and use cues to try and differentiate among these objects. Comparisons are not possible in between-subject designs, and the same cues may seem less important and therefore have less impact on evaluations. For example, the color of a car may not seem to be a critical feature when considering purchasing one specific car, yet color may become the defining factor when the decision involves a comparison of two or more mostly similar cars that differ mainly on color.

Demand effects may be stronger in within-subject design (Zizzo, 2010). Participants in within-subject designs may infer the experimental design by making comparisons, and adjust their responses according to what they think the experiment is meant to test. For example, willingness to pay for a sandwich at the airport will be much larger in within-subject condition (e.g., when such sandwich will be explicitly contrasted with a sandwich in a regular store), compared to in between-subject design (e.g., when half of participants would estimate their willingness to pay for a sandwich at the airport, and the other half in a regular store) (Charness, Gneezy, & Kuhn, 2012). We predicted that mere ownership effects will be stronger in within-subject designs.

#### Dependent variable: Liking versus pricing

Preference for an object can be expressed in many ways. Two broad categories used in mere ownership research are liking evaluations of an object (i.e., how good an object is) and object pricing (i.e., how much an object is worth). These measures are sensitive to different external cues. For example, in one study people liked organic beef over conventional beef, and wanted to pay more for it, but products' pricing did not correlate with liking (Napolitano et al., 2010). Possibly, the individuals who wanted to pay more for the organic beef were different individuals who liked the organic beef more, which suggests that these two processes of liking and pricing could be psychologically distinct. Other research suggests that contextual cues (pricing of similar products) affect pricing but less so for the liking of a target product (Adval & Monroe, 2002). Moreover, pricing has objective anchors (i.e., market price of a similar object) whereas liking is purely subjective, and therefore might be more malleable (Chapman &

Johnson, 2002). Finally, it has been suggested that liking is encoded in a different brain region than pricing (Kodaverdian, 2019).

All the above research suggests pricing and liking can tap into different psychological processes. We therefore expected stronger mere ownership effect in liking compared to pricing.

#### Method

#### **Pre-registration and protocol**

We pre-registered our meta-analysis plan including coding and data analysis procedures on the Open Science Framework (<u>https://osf.io/txnsk</u>). Materials used in this meta-analysis and disclosures are provided in the supplementary. Data, code, and materials were shared on the Open Science Framework (<u>https://osf.io/fdygw/</u>).

#### Literature search and selection of studies

Search, coding, and data collection ended in 2018 and the meta-analysis covers the literature up until that point. We searched Google Scholar for ownership related keywords and articles that cited or were related to Beggan (1992) (See Supplementary Materials for details)<sup>2</sup>. A total of 765 articles were identified. After reading their abstracts, we identified 93 relevant articles and reviewed each of these papers to evaluate adherence to inclusion and exclusion criteria. We only included experiments that explicitly manipulated psychological or perceived ownership (e.g., owner versus non-owner), and assessed evaluations, rankings, or liking of target objects as the dependent variables. We contacted all authors of identified publications, contacted researchers on mailing lists, issued call for unpublished papers on social media, and posted preprints of our work eliciting feedback and studies. However, despite our efforts we were

<sup>&</sup>lt;sup>2</sup> We relied uniquely of the Google Scholar database, since it is a most comprehensive database, including also preprints and working papers. Recent work suggests such query is suitable for conducting meta-analyses (Gehanno, et al., 2013; Martín-Martín, et al., 2018; Walters, 2007).

unsuccessful in finding unpublished manuscripts beyond the ones we identified through our search process.

Our goal was to test the mere ownership effect, and to disentangle the effect from the buyer-seller paradigm, in which the increase in pricing or evaluations of an owned object could be attributed to strategic choices and the possibility of participants assuming their task was to negotiate as much as possible for what they are expected to sell (Plott & Zeiler, 2005). To focus our efforts solely on the mere ownership phenomenon, we formulated the following exclusion criteria: (1) perceived ownership was only mentioned but not directly measured, (2) owners and sellers were treated interchangeably, (3) studies involving a transaction of an owned or non-owned object, (4) studies on loss aversion and name letter/birthday number effects (which later developed into a prolific area of inquiry regarding implicit self-esteem), (5) experiments with ownership as the dependent variable, or with indirect dependent variables such as accuracy of recall, memory, reaction time, or implicit indirect evaluations, and (6) reported data were insufficient to calculate effect sizes.

## Table 2

## Samples included in the meta-analysis

	Study and sample	DV type	Ν	Ownership duration	Actual (vs. replica) ownership	Explicit (vs. Implicit) ownership	Loss aversion	Mere exposure	Material (vs. immaterial) object	Research Design	Factual ownership
1	Barone, Shimp, & Sprott (1997) S1	Evaluation	149	Immediate /recent	Replica	Explicit	No potential loss	Same exposure	Material	Within- subjects	Factual ownership
2	Barone, Shimp, & Sprott (1997) S2	Evaluation	43	Immediate /recent	N/A	Explicit	No potential loss	Same exposure	Material	Between- subjects	Factual ownership
3	Barone, Shimp, & Sprott (1997) S3	Evaluation	94	Immediate /recent	Actual	Explicit	No potential loss	Same exposure	Material	Between- subjects	Factual ownership
4	Barone, Shimp, & Sprott (1997) S4	Evaluation	92	Immediate /recent	N/A	Explicit	No potential loss	Same exposure	Material	Between- subjects	Factual ownership
5	Beggan (1992) S1	Evaluation	41	Immediate /recent	N/A	Explicit	No potential loss	Same exposure	Material	Within- subjects	Factual ownership
6	Beggan (1992) S2	Evaluation	57	Immediate /recent	N/A	Explicit	No potential loss	Same exposure	Material	Within- subjects	Factual ownership
7	De Dreu & van Knippenberg (2005) S1	Price	95	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Immaterial	Between- subjects	Factual ownership
8	De Dreu & van Knippenberg (2005) S2	Price	299	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Immaterial	Between- subjects	Factual ownership

	Study and sample	DV type	Ν	Ownership duration	Actual (vs. replica) ownership	Explicit (vs. Implicit) ownership	Loss aversion	Mere exposure	Material (vs. immaterial) object	Research Design	Factual ownership
9	De Dreu & van Knippenberg (2005) S3	Price	44	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Immaterial	Between- subjects	Factual ownership
10	De Dreu & van Knippenberg (2005) S4	Price	82	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Immaterial	Between- subjects	Factual ownership
11	Feys (1991) S1	Evaluation	82	Immediate /recent	N/A	Explicit	No potential loss	Same exposure	Immaterial	Within- subjects	No factual ownership
12	Morewedge, Shu, Gilbert & Wilson (2009) S1	Price	45	Immediate /recent	Actual	Explicit	Potential loss vs. No potential loss	Different exposure	Material	Between- subjects	Factual ownership
13	Morewedge, Shu, Gilbert & Wilson (2009) S2	Price	78	Immediate /recent	Actual	Explicit	No potential loss	Different exposure	Material	Between- subjects	Factual ownership
14	Nesselroade, Beggan, & Allison (1999) S3	Evaluation	22	Immediate /recent	Actual	Explicit	No potential loss	Same exposure	Material	Between- subjects	Factual ownership
15	Nikander, Liikkanen & Laakso (2014) S1	Evaluation	18	Immediate /recent	Actual	Explicit	No potential loss	N/A	Immaterial	Between- subjects	No factual ownership
16	Peck & Shu (2009) S1	Price	231	Immediate /recent	Actual	Implicit	No potential loss	Same exposure	Material	Between- subjects	No factual ownership
17	Peck & Shu (2009) S3	Price	401	Immediate /recent	Actual	Explicit	Potential loss	N/A	Material	Between- subjects	Factual ownership
18	Peck & Shu (2009) S4	Price	334	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Material	Between- subjects	Factual ownership

	Study and sample	DV type	Ν	Ownership duration	Actual (vs. replica) ownership	Explicit (vs. Implicit) ownership	Loss aversion	Mere exposure	Material (vs. immaterial) object	Research Design	Factual ownership
19	Sen & Johnson (1997) S1	Evaluation & Price	36	Immediate /recent	Replica	Explicit	No potential loss	Same exposure	Material	Within- subjects	Factual ownership
20	Sen & Johnson (1997) S2	Evaluation & Price	96	Immediate /recent	Replica	Explicit	No potential loss	Same exposure	Material	Within- subjects	Factual ownership
21	Shu & Peck (2011) S1	Price	67	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Material	Between- subjects	Factual ownership
22	Strahilevitz & Loewenstein (1998) S1	Price	85	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Material	Between- subjects	Factual ownership
23	Toma, Bry & Butera (2013) S1	Evaluation	50	Immediate /recent	Actual	Implicit	No potential loss	Same exposure	Immaterial	Within- subjects	No factual ownership
24	Walasek, Rakow, & Matthews (2017) S1	Evaluation & Price	168	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Material	Between- subjects	Factual ownership
25	Walasek, Rakow, & Matthews (2017) S2	Price	175	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Material	Between- subjects	Factual ownership
26	Walasek, Rakow, & Matthews (2017) S3	Price	140	Immediate /recent	Actual	Explicit	Potential loss	Same exposure	Material	Between- subjects	Factual ownership

*Note.* S = Study number. N/A = information not available in the original studies.

## Figure 1

## Meta-analysis PRISMA flow diagram



In the final sample we included a total of 26 unique samples from 13 articles (N = 3024) (see Table 2 for a summary of the selected experiments and the variables in each of the experiments). All but one samples were university students, and all of the samples were from Western countries (e.g., the U.S., UK, Netherlands, Finland, etc.)<sup>3</sup>. The PRISMA diagram in Figure 1 illustrates the four stages of study search and inclusion.

#### Coding

We pre-registered a coding worksheet. In a pilot test, two authors coded five studies and refined coding in two rounds, reaching a consensus on coding scheme and procedure. Authors then divided their role in coding the rest of studies. One junior author extracted relevant information from articles about the ownership manipulation, dependent variables, reported statistics used to calculate effect sizes, and moderators. Each row in the coding sheet recorded one comparison between ownership versus non-ownership. If the original experiment examined moderating factors other than ownership, then the information for ownership for each of the moderator levels was recorded in separate rows. A second more senior author then verified the extracted data and information, and made adjustments if necessary. A third author later verified the coding and analyses.

We coded effect sizes when those were reported. In cases where effect sizes were not reported, we used descriptive statistics (i.e., mean, standard deviation), and resulted to inferential statistics (i.e., F values, t values, degrees of freedom) when those were not available. Eventually, all effect sizes were converted to Hedge's g. All the conversions and coding decisions were documented in the coding sheet to ensure reproducibility.

<sup>&</sup>lt;sup>3</sup> Almost all collected samples were from the USA (62%), Netherlands (15%), and the UK (12%), and all but one studies tested students (96%). A question arises about generalizability of our findings beyond the overrepresented in this metaanalysis western samples. Given the lack of diversity, we are unable to statistically test for this issue, but encourage researchers to test other populations for the mere ownership effect.

#### Analyses

We used the Metafor package in R (Viechtbauer, 2010) for data analyses. Taking into account the variations induced by potential moderators and different research designs (i.e., between-subjects versus within-subjects), we applied a random-effects with maximum likelihood model. First, we examined the overall effect size of mere ownership across studies. We also tested for the heterogeneity – the extent to which variation in the effect sizes was accounted by differences in true effects or by sampling error – with a Cochran's Q test and the  $l^2$  statistic (Higgins, Thompson, Deeks, & Altman, 2003). Second, we examined the possibility of a publication bias in the overall mere ownership effects. Third, we tested the effects of the proposed moderators.

#### Results

We summarized the findings in Table 3 and indicated whether we found support for the meta hypotheses in Table 1. Forest and funnel plots of the included samples are presented in Figure 2 and Figure 3.

### Table 3

## Summary of effect sizes for main and moderator analyses

				95% CI	95% CI	
Analyses	Hedge's g	SE	р	Lower	Upper	k
Main analysis	0.55	0.06	< .001	0.43	0.66	26
Actual ownership	0.66	0.07	< .001	0.53	0.78	18
Replica ownership	0.29	0.15	= .060	0.01	0.58	3
Legal/factual ownership	0.54	0.06	< .001	0.41	0.6	22
No legal/factual ownership	0.60	0.13	< .001	0.35	0.84	4
Potential loss	0.69	0.08	< .001	0.54	0.84	12
No potential loss	0.43	0.07	< .001	0.30	0.57	15
Same exposure	0.51	0.06	< .001	0.39	0.64	22
Different exposure	0.74	0.19	< .001	0.36	1.11	2
Material object	0.48	0.07	< .001	0.35	0.61	19
Immaterial object	0.73	0.10	< .001	0.54	0.92	7
Between-subjects design	0.61	0.07	< .001	0.48	0.73	19
Within-subjects design	0.41	0.10	< .001	0.22	0.61	7
Evaluation	0.40	0.07	< .001	0.25	0.54	13
Price	0.63	0.06	< .001	0.51	0.75	16
Implicit	0.64	0.28	= .0213	0.10	1.18	2
Explicit	0.54	0.06	< .001	0.42	0.66	24

#### **Overall mere ownership effect**

We first examined the overall effect of mere ownership on evaluation/liking. The mean effect size was positive and significantly different from null (k = 26, g = 0.55 [0.43, 0.66]). This suggests that across the selected studies, participants had more positive evaluations or more liking towards owned objects relative to not-owned objects. We provided evidence for the existence of the mere ownership effect to be larger than zero, yet we caution in considering meta-analysis as definite (Kvarven, Strømland, & Johannesson, 2019).

#### **Publication bias**

We summarized publication bias analyses in Table 4. Publication bias findings were not conclusive, yet they were suggestive of a possible publication bias in favor of the effect, possibly leading to an over-estimation of the effect. Still, even with corrections for publication bias the mere ownership effect was found meaningfully different than the null.

For example, using the three-parameter selection model, considered by recent reviews to be the best performing bias correction method (Carter, Schönbrodt, Gervais, & Hilgard, 2018), the mere ownership effect was g = 0.40 [0.19, 0.62], with comparable effects for other correction methods (Puniform: g = 0.54 [0.44, 0.67]; Henmi & Copas: g = 0.44 [0.28, 0.61]; trim and fill: g= 0.46 [0.33, 0.58]). Therefore, regardless of the publication bias analyses and the correction employed, all models indicated a weak to medium effect size (g > 0.32, except for PET) with confidence intervals that do not include the null.

## Figure 2

## Forest plot of effect sizes for studies included in the meta-analysis.

						8.18
Barone Shimp Sprott 1997 / 1	149		¢.			0.01 [-0.11, 0.14]
Barone Shimp Sprott 1997 / 2	43		I.			0.96 [-0.57, 0.45]
Barone Shimp Sprott 1997 / 3	94		•			0.27 [-0.08, 0.62]
Barone Shimp Sprott 1997 / 4	92		· · · · · ·			0.50 [ 0.14, 0.05]
Beggan 1992 / 1	41	34				0.35 ( 0.03, 0.66)
Beggan 1992 / 2	57					0.37 [ 0.10, 0.63]
De Drau van Knippenberg 2005 / 1	95					1.09 [ 0.66, 1.52]
De Dreu van Knippenberg 2005 / 2	299		<b>⊢</b> •−−1			0.61 [ 0.28, 0.74]
De Dieu van Knippenberg 2005 / 3	44		• •			0.92 [ 0.31, 1.53]
De Dreu van Knippenberg 2005 / 4	82		·			0 78 [ 0 33, 1.22]
Feys 1991 / 1	82					0.58 [ 0.33, 0.82]
Morewedge, Shu, Gilbert & Wilson, 2009 / 1	45	-	· · · · · · · · · · · · · · · · · · ·			0.95[0.43, 1.48]
Morewedge, Shu, Gilbert & Wilson, 2009 / 2	78		·			0.57 [ 0.12, 1.02]
Nesseiroade, Beggan & Allison, 1999 / 3	22		+	4		1.10[0.23, 1.96]
Nikander & Liikkanen, 2014 / 1	18	( <del>   </del>				0 64 [-0 14, 1,43]
Peck & Shu, 2009 / 1	231		<b>⊢</b> •−−1			0.38 [ 0.12, 0.64]
Peck & Shu, 2009 / 3	401	-	<b>⊢</b> ∎–+			0.81 [ 0.01. 1.01]
Pack & Sho, 2005 / 4	334					0.35 [ 0.13, 0.56]
Sen, Johnson, 1997 / 1	36	-				0.39 [ 0.12, 0.67]
Sen, Johnson, 1997 / 2	96		<b>⊢</b> •−−1			0.48[0.31, 0.65]
Shu & Peck, 2011 / 1	67	-	• •			0.56 [ 0.06, 1.04]
Strahilevitz & Loewenstein, 1990 / 1	85					0 76 [ 0 32, 1 20]
Toma, Bry & Butera, 2013 / 1	50		· · · · · · · · · · · · · · · · · · ·			0.94 [ 0.53, 1.35]
Walasek, Rakow, & Matthews, 2017 / 1	168					0.37 [ 0.11, 0.64]
Walasek: Rakow, & Matthews, 2017 / 2	176		<del>i •</del>			0.96 [ 0.64, 1.27]
Walasek, Rakow, & Matthews, 2017 / 3	140		·			0.74 [ 0.40, 1.08]
RE Model			•			0.55[0.43.0.66]
	-2	-0.5	1	2.5	4	

## Figure 3

Funnel plot with Trim and Fill



*Note.* Funnel created using metaviz R package (Kossmeier et al., 2019). White dots indicate included studies, black dots added by trim and fill simulation for missing studies, with dotted line indicating adjusted meta-analytic estimate given the trim and fill adjustment. Red line indicated Egger's regression line.

## Table 4

### Publication bias analyses

Publication bias analysis method	Results and adjusted models
Three-parameter selection model	Likelihood Ratio Test: $\chi^2(1) = 5.33$ , $p = 0.02$ Adjusted Model: $g = 0.40$ [0.19, 0.62]
PET	b = 0.08 [-0.16, 0.33], $p = .476$
PEESE	$b = 0.32 \ [0.17, 0.47], \ p < \ .001$
Puniform	Adjusted Model: $g = 0.54$ [0.44, 0.67], 22 significant
Henmi & Copas (2010)	Adjusted Model: $g = 0.44 [0.28, 0.61]$
Trim and fill funnel plot asymmetry	6 studies missing on the left side. Adjusted model: $g = 0.46 [0.33, 0.58]$ ) (see Figure 3)
Rank correlation test (Begg & Mazumdar, 1994)	Kendall's tau = 0.16, $p = .255$
Egger's regression test	z = 2.54, p = 0.011

*Note.* Values in parentheses indicate 95% confidence intervals [lower bound, upper bound]

#### **Moderator analyses**

We first conducted a Cochran's Q test and found significant heterogeneity between effect sizes across studies (Q = 105.80;  $I^2 = 70.9\%$ ; p < .001), indicative of moderate to high variance (Higgins et al., 2003). We therefore proceeded with the planned moderator analyses.

We coded theoretical and methodological moderators according to a pre-registered criteria and coding sheet: Duration of ownership, use of replica, implicit versus explicit ownership, factual vs imagined ownership, potential loss of ownership, mere exposure, object materiality, research design between-within subject; and type of the DV: liking vs price. The duration of ownership moderator had no variance in the coded experiments, thereby resulting in eight moderators.

When planning the meta-analysis, we expected a larger set of samples. Yet, the small studies sample size that met our pre-registration inclusion/exclusion criteria resulted in low power and limited our ability to conduct robust moderator analyses using a traditional meta-regression. To allow for moderator analyses and address the power issue without risking overfitting, we employed metaforest (Curry et al., 2018; Van Lissa, 2017), which uses a machine learning algorithm "random forests" and bootstrapping to assess several potential moderators. This is an unexpected extension which we did not include in the pre-registration data analysis plan. The full results and detailed plots are provided in the supplementary. The main indicator of R squared (R-OOB) was 0.26, indicating that moderators predicted variance in the effect ( $I^2$ : 74.7%; Q: 178.74, p < .001), with the valuing type, use of replica, and object materiality showing the highest variable/permutation importance, followed by weaker importance for loss aversion and legal/factual ownership, and close to no effect for mere exposure and implicit versus explicit ownership (see Supplementary Materials for details).

We aimed to supplement the metaforest moderator findings by conducting a *z*-test moderation analysis of the effects for the identified important moderators. The effects of the moderators per each coded category are reported in Table 3 and their z-test and multi-level regression analyses (using a single moderator) are detailed in Table 5. Use of replica, loss aversion, and valuing type had the strongest effect with both z-test and multi-variate multi-level effects p < .05.

Based on both analyses combined we conclude valuing type, potential of loss, and use of replica as strongest moderators of the mere ownership effect.

#### Table 5

Moderators	Diff	SE		п	95% CI	95% CI	k	MV
moderators	Dill	5L	Z	P	Lower	Upper	n	ML p
Actual vs. replica ownership	-0.37	0.17	-2.47	.025	-0.70	-0.05	21	.011
Legal vs. no clear legal ownership	0.06	0.14	0.41	.680	-0.22	0.33	26	.794
Potential loss vs. no potential loss	0.43	0.10	2.49	.013	0.05	0.46	27	.009
Same vs. different exposure	-0.21	0.21	-0.97	.328	-0.62	0.21	24	.311
Material vs. immaterial object	-0.25	0.12	-2.14	.032	-0.48	-0.02	26	.064
Between vs. within design	-0.19	0.12	-1.58	.114	-0.43	0.05	26	.080
DV category: Evaluation vs. price	0.24	0.10	2.47	.013	0.05	0.42	29	.018
Implicit vs. explicit	0.10	0.28	0.35	.724	-0.46	0.66	26	.673

#### Comparisons for all moderators

*Note*. Bolded moderators were found to be significant on the mere ownership effects, with 95% confidence intervals not including zero. Number of studies in comparison may be higher than overall number of samples included in the meta-analysis (26) due to some studies manipulating a factor (e.g., loss) or including more than one factor (e.g., evaluation vs. price). MV ML p = p-value for multi-variate meta-analysis multi-level moderator analysis.

#### Discussion

#### Mere ownership effect: Main findings

We conducted a meta-analysis of mere ownership effect and our findings revealed consistent support for the phenomenon, with psychological ownership leading to higher valuations of an object. We found some indications yet no conclusive evidence for publication bias. We applied corrections for publication bias and found that even using most methods the mere ownership effect was different from the null with most indicating a moderate effect (with the exception of PET). Our findings suggest that the mere ownership effect is fairly robust, with positive medium to large effects across all subgroups of the studied moderators (see Table 3) and publication bias corrections.

#### Moderators

We found moderate to high variance in the meta-analytic effects, and we theorized and tested several potential moderators. We summarized our conclusions regarding the moderator hypotheses in Table 1. Given the limited number of studies, and relatively small sample sizes in them, the evidence supporting any of the moderators is rather weak, and should be considered only as a signpost for future studies. We found that the mere ownership effects were stronger in studies where: (1) evaluations were given on the target objects rather compared to on a replica, (2) measurement was of price compared to liking. There were some indications for partial support for loss aversion, yet we summarize weaker support and mixed findings across the different methods for the other moderators.

#### Similarities in Endowment and Ownership effects

We note similarities between the mere ownership and endowment effects. In their review paper, Morewedge and Giblin (2015) mentioned that the endowment effect is not limited to

material objects and has also been shown to apply to "entitlements such as time, intellectual property, public land, and environmental, health, and safety regulations" (p. 339). Similarly, mere ownership affects immaterial objects such as set of arguments to be used in a discussion (De Dreu & van Knippenberg, 2005), or self-generated design concepts (Nikander, Liikkanen & Laakso, 2014). The endowment effect has been observed in goods to be acquired as much as in actually owned goods (Ericson & Fuster, 2014). Similar effects have been observed for mere ownership, as factual ownership was not required for the effect to occur and implied ownership was enough to affect valuations (Nikander, Liikkanen & Laakso, 2014; Peck & Shu, 2009). Finally, research on children has shown that children display both the endowment effect (Harabaugh, Krause, & Vesterlund, 2001; Hood et al., 2016) and the mere ownership effect (Hood & Bloom, 2008; Hartley & Fisher, 2018), suggestive of an innate characteristic of both effects. These similarities are the reason why the two concepts are sometimes treated interchangeably.

#### **Disentangling the Ownership-Endowment Confounds**

We organized differences between the endowment and the mere ownership effects into two groups: theoretical and methodological. From the theoretical perspective, mere ownership may involve psychological and other factors that are not related to trading or endowment effect, and endowment effect phenomenon may involve factors that go beyond or are unrelated to ownership (e.g., recalling different reference prices, or misperception of the experiment as a bargain exhibit; Morewedge & Giblin, 2015). Related evidence comes from Reb and Connolly (2007). In their experiment, people who possessed a chocolate bar valued it more, but this effect was fully mediated by perceived ownership. Specifically, those who possessed a bar felt greater ownership, which in turn predicted higher valuations of the bar. According to their findings,
valuation effects of possession can be fully explained by psychological ownership and the mere ownership effect. This is but just one experimental finding contributing to an ongoing debate on this topic.

From the methodological perspective, a major difference is that the endowment effect is mostly studied using pricing of owned objects, whereas the mere ownership effect is often investigated with liking or other subjective measures of preference. Next, the buyer-seller paradigm used in endowment effect research conflates ownership with expected transfer of ownership eliciting loss-gain related effects such as loss aversion (Chatterjee, Irmak, & Rose, 2013). Experimental evidence supporting the loss aversion explanation of endowment effect has been mixed. It has been supported by some studies (e.g., Carmon & Ariely, 2000; Johnson, Häubl, & Keinan, 2007; Kahneman, Knetsch, & Thaler, 1990), whereas other studies demonstrated that it was not loss aversion but perceived ownership associations that induced mere ownership effects (e.g., Maddux et al., 2010; Morewedge et al., 2009; Peck & Shu, 2009). Hence, perceived ownership can be used to explain the endowment effect, and loss aversion could be seen as a factor that further amplifies this effect. Alternatively, loss aversion requires feelings of ownership to even occur, and thus cases where ownership is weak produce little to no loss aversion, and cases where ownership is strong produce significant loss aversion.

#### Mere ownership and endowment effects

How does mere ownership effect relate to endowment effect? Above, we discussed similarities and differences between the two effects. This meta-analysis cannot and was not meant to resolve this debate or provide evidence to support one account over the other. Yet, in our meta-analysis we attempted to zero in on mere ownership effects that do not involve

37

endowment by excluding studies that conflated buying versus selling and WTA-WTP paradigms with ownership.

We briefly address this debate by reviewing several perspectives on the conceptualization and link between the mere ownership effect and the endowment effect below, with three models summarized in Figure 4. In this diagram, large boxes correspond to broader concepts, and smaller boxes to narrower concepts. When one concept is encompassed within the other in a box then this it meant to suggest that the boxed concept is a narrower instantiation of the encompassing concept. The arrow below each box represents the magnitude of the loss aversion involved in a particular process, and the endowment effect appears to the right than the mere ownership effect. One view, depicted in Panel A, suggests that the endowment effect is broader, as it encompasses several factors including psychological ownership (Morewedge & Giblin, 2015). Another view, depicted in panel B, suggests that the mere ownership effect is broader, with the endowment effect being the narrower trade-related exemplification (Beggan, 1992; Mandel, 2002; Ziano et al, 2020).

### Figure 4

Three views on the conceptualization of mere ownership effect and endowment effect



We reviewed similarities between endowment and mere ownership effects. The mere ownership and the endowment effects seem to affect both material and immaterial objects. The two effects also do not require factual ownership, but a mere implication of ownership suffices for the effects to occur. The endowment effect is typically demonstrated using pricing valuations. Our findings demonstrated that ownership affected both pricing and evaluations, with slightly stronger effects for pricing. Future research may examine the interplay of these two types of dependent variables and how both are affected under the endowment and mere ownership paradigms.

Considering the similarities between the two concepts, we introduce a third perspective which suggests that the mere ownership effect and the endowment effect may be instantiations of the same psychological process differing in the degree of loss aversion (Figure 4, panel C). In that model, both effects are on two ends of the same continuum, from weaker loss aversion for the mere ownership effect to stronger loss aversion for the endowment effect (Gawronski, Bodenhausen, & Becker, 2007; Hoorens, Remmers, & Van De Riet, 1999; Morewedge et al., 2009). Both effects can be thought of as differently operationalized and investigated instantiations of the same psychological process.

This meta-analysis cannot help and decide between the three accounts. Instead, we propose a framework to unify them. We call on future research to try and further elucidate these links and possibly disentangle mere ownership from endowment effect to test the three suggested accounts.

### Limitations and future directions

Our meta-analysis reflects a problem in the field of the mere ownership research, that is, scarcity of direct experimental evidence. After exclusion of potential confounding research such as name-letter research and tasks involving trading, we were left with only 13 papers with 26 experiments. A streamline effect of this scarcity of research is that some of our moderator analyses included samples as small as n = 2 for difference in exposure to the object, and for implicit vs. explicit mentioning of ownership, n = 3 for replica ownership, and n = 4 for legal vs. no legal ownership. Moreover, all analyzed experiments have relatively weak power, with total number of subjects' N = 3024 which averages to about n = 120 per experiment. Such sample size merely allows the detection of relatively large effects of d = 0.51.

We aimed to deal with this issue by employing a dedicated machine learning algorithm (random forest) and increasing the analyzed sample size by repeated sampling with replacement of the available data (bootstrapping). Although these methods perform quite well in simulations, they can never replace real data. We therefore call on scientists interested in mere ownership or endowment effect to further test these effects, especially in the context of potential moderators and using other samples (more on that below). Replica (vs. original) and valuing type seem to be

the most likely to return meaningful results for moderation effects that have never been directly tested. We also call scientists to try to disentangle mere ownership from the endowment effect.

The experiments included in the meta-analysis were conducted in the USA and in the European Union countries. All but one experiments tested graduate or undergraduate students. We were surprised by the small number of studies conducted on this important phenomenon, and this is one of the largest challenges with the existing data: limiting our ability to generalize findings (Henrich et al., 2010). Therefore, more work is required to assess the robustness of the mere ownership bias in other samples, and in different cultures. Moreover, many of the studies, despite being flagship papers at the time of their publication, seem to suffer from low power and small samples. Many of the included studies were meant as a demonstration of the effect yet provide us with limited information about the magnitude of the effect. For example, the seminal work by Beggan (1992) estimated the effect size from an almost negligible g = 0.07 to implausibly large g = 1.32. To better illustrate this range, if studies would compare IQ score across groups, these effect sizes would mean a difference in scores ranging from about 1 point to almost 20 points. This has critical implications for practitioners, considering how much of an impact ownership can have on evaluations and pricing of objects.

#### Conclusion

We conducted a meta-analysis and found support for mere ownership effect with an overall medium effect size and with replica use, potential of loss, and valuing type moderating the effect. Our findings indicated that mere ownership effect may occur regardless of related phenomena of endowment effect and loss aversion and our moderator analyses suggested directions for exploring boundary conditions. We call for much more future research into this

41

phenomenon, and research aimed at disentangling and linking the mere ownership and endowment effects.

### **Open Practices Statement**

We pre-registered our meta-analysis plan including coding and data analysis procedures on the Open Science Framework (<u>https://osf.io/txnsk</u>). Study was pre-registered prior to conducting the research. Materials used in this meta-analysis and disclosures are provided in the supplementary. Data, code, and materials were shared on the Open Science Framework (<u>https://osf.io/fdyqw/</u>). Data collection was completed before conducting an analysis of the data. All variables collected for this meta-analysis are reported and included in the provided data.

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# <u>Owning leads to valuing:</u> <u>Meta-analysis of the Mere Ownership Effect</u>

# **Supplementary Materials**

## Contents

Open Science 3
Disclosures
Data collection
Variables reporting
Planned moderators 4
Duration of ownership 4
Actual versus replica ownership 4
Explicit versus implicit ownership 4
Loss aversion 4
Mere exposure
Material versus immaterial object 5
Research design 5
Metaforest Moderator analyses
Results6
Moderator importance analyses7
Moderation effect plots
Materials versus immaterial 8
DV category9
Replica
Mere exposure 10
Legal/factual ownership 10
Loss aversion 10
Implicit versus explicit ownership 12
PCurve analysis 13
Summary 13
PCurve analysis graph
Pcurve results

Pcurve interpretation:	5
Process 16	6
Search16	5
Contacting authors	6
Contact template	5
Meta-analysis pre-registration 18	8
Introduction	8
Background 18	8
The dependent variable: Evaluation/liking 18	8
The independent variable: Ownership 18	8
Goals and research questions 19	9
Goal statement	9
Research questions19	9
Hypotheses 19	9
Main hypothesis19	9
Moderators 19	9
Exploratory moderators	C
Methods22	1
Description of essential elements 22	1
Analysis plan 23	3
Confirmatory analyses 23	3
Exploratory analyses	3
Answer the following final questions: 23	3
Conflicts of Interest 24	4
References 25	5
Deviations: Comparison of process versus pre-registration 27	7
Further challenges and implications 27	7

### **Open Science**

Pre-registration, meta-analysis search and coding materials, open-science disclosures are reported, with data and annotated RMarkdown code and output made available for reviewers and readers on the Open Science Framework (OSF; <u>https://osf.io/fdyqw/</u>).

### Disclosures

### **Data collection**

Data collection was completed before conducting an analysis of the data.

Search, coding, and data collection ended in 2018 and the meta analysis covers the literature up until that point. The manuscript has been going through rounds of review since.

### Variables reporting

All variables collected for this meta-analysis are reported and included in the provided data.

### **Planned moderators**

#### **Duration of ownership**

There have been mixed views regarding whether the duration of ownership is a factor in the mere ownership effect. On one hand, Strahilevitz and Loewenstein (1998) suggested that people tend to value an object more immediately after owning it, though argued it may also take some time for full sense of ownership to develop and reach maximal impact. They demonstrated that favorable evaluations of an owned object would increase the longer the ownership lasts, and this has been successfully replicated in subsequent studies (e.g., Shu & Peck, 2011). On the other hand, some studies found that mere ownership effects occur even before the ownership has been clearly defined (Peck & Shu, 2009).

The duration of ownership varies across existing studies. In some studies, participants rated an object given to them in the experiment (e.g., Beggan, 1992), whereas in other studies, participants evaluated an object that has been owned for a long period of time (e.g., Nesselroade, Beggan, & Allison, 1999). To clarify the impact of ownership duration on the mere ownership effects, we predicted that the duration of ownership is positively related to mere ownership effects, such that the mere ownership effects would be stronger the longer the duration of ownership.

### Actual versus replica ownership

In actual ownership, the evaluated object is owned by the individual, whereas in replica ownership, the evaluated object is a replica - an object similar to the one owned. Past research suggested that replicas may trigger weaker mere ownership effects than actual objects did. For example, Barone et al. (1997) conducted a direct replication of Beggan's studies (1992), but their results were inconsistent with that of Beggan's (1992) showing much smaller effect size. Later, Beggan and Allison (1997) conducted a mini meta-analysis of their studies and concluded that the Barone et al. (1997) manipulated ownership by asking participants to evaluate a replica, which appeared to be a crucial departure from Beggan's (1992) manipulation in which the actual owned object was used. Beggan and Allison (1997) argued that the weakened effects could perhaps be explained by participants' weaker or no connection with the replica compared to an object that is factually owned. Thus, we predicted that mere ownership effects would be stronger when the target object is owned compared to when the target object is a replica.

#### Explicit versus implicit ownership

We define explicit ownership as perceived ownership in the *presence* of actual ownership, and implicit ownership as perceived ownership in the *absence* of actual ownership, such as ownership imagery. Peck and Shu (2009) found that even implicit ownership through imagery and/or touch could elicit individuals' perception of ownership and improved their evaluations of an object. It seems that both explicit and implicit ownership can induce the mere ownership effects. Still, explicit ownership possibly produces a stronger sense of ownership than implicit ownership. For example, Beggan and Brown (1994) found that people perceived a person to have a stronger claim of ownership of an object when this person was pictured together with the target object. Therefore, we predicted that the mere ownership effects would be stronger when the ownership is explicit relative to implicit.

#### Loss aversion

The mere ownership effects are sometimes confounded with the endowment effect, that people demand higher prices when selling an object than they would be willing to pay for it as

buyers (Thaler, 1980). Selling implies a loss, and buying implies a gain. The negative affect caused by a loss is larger than the positive affect caused by an equivalent gain (Kahneman & Tversky, 1984). Applying this rationale of loss aversion to ownership, it is possible that people set a higher price for an owned object in a transaction not because of ownership but because of the anticipated negative feelings for forgoing the object. This idea has been supported by some studies (e.g., Carmon & Ariely, 2000; Johnson, Häubl, & Keinan, 2007; Kahneman, Knetsch, & Thaler, 1990), yet other studies demonstrated that it was not loss aversion but perceived ownership association that induced the mere ownership effects (e.g., Maddux et al., 2010; Morewedge et al., 2009; Peck & Shu, 2009). Meanwhile, in mere ownership effect experiments and many of the endowment effect experiments, it is common to treat owners and sellers as interchangeable in simulated trades, leading to the problem that potential loss and ownership are confounded in transaction situations (e.g. Walasek, Matthews, & Rakow, 2015; Morewedge et al., 2009).

To tease apart the influences of potential loss and ownership, we set up two competing hypotheses regarding the moderating role of loss aversion on the mere ownership effects. Chatterjee, Irmak, and Rose (2013) found that when the object was perceived as part of the self, selling became threatening and led to an enhanced mere ownership effect. Accordingly, we predicted that the mere ownership effects would be stronger when there is potential loss compared to no potential loss. Yet, it is possible that ownership alone is sufficient to induce positive evaluation or liking of the owned object (Morewedge et al., 2009). Therefore, we also predicted that the mere ownership effects would not be affected by loss aversion.

Importantly, we aimed to focus on mere ownership effects separate from that of the endowment effect, to make a clear differentiation between the two phenomena. We therefore limited the scope in the pre-registration of the meta-analysis to studies that do not contrast buyers against sellers and/or willingness to pay (WTP) against willingness to accept (WTA). We will further discuss this in the methods section.

#### Mere exposure

The mere exposure effect is the phenomenon that mere repeated exposure to an object enhances favorable evaluations of the object (Zajonc, 1968). Since ownership often involves more exposure to the owned object, it is unclear whether or to what extent mere ownership effect is accounted by mere exposure (Beggan, 1992).

We set up different hypotheses regarding the moderating role of mere exposure on the mere ownership effects. On one hand, we expected that the mere ownership effects would be stronger with longer exposure. On the other hand, Beggan (1992) revealed that the mere ownership effect was not affected by the length of exposure or the amount of contact, leading to the expectation that the mere ownership effect perhaps occurs regardless of exposure.

#### Material versus immaterial object

Research on mere ownership effect demonstrated the effects on both material objects such as insulators and mug (e.g., Barone et al., 1997; Morewedge et al., 2009), and immaterial objects, such as arguments (De Dreu & van Knippenberg, 2005), letters (Nuttin, 1987), symbols (Feys, 1991), and time (Hoorens, Remmers, & van de Riet, 1999). We developed competing hypotheses regarding the moderating effect of material versus immaterial objects - that the mere ownership effect would be stronger for material objects over immaterial objects against the hypothesis that the mere ownership effects would not be affected by the nature of object (material vs. immaterial).

#### **Research design**

In addition to the above, we also examined differences in research design (i.e. betweensubject versus within-subject).

### **Metaforest Moderator analyses**

### Results

```
## MetaForest results
##
## Type of analysis:
                          MetaForest
## Number of studies:
                            41
                              7
## Number of moderators:
## Number of trees in forest:
                             500
## Candidate variables per split: 2
## Minimum terminal node size: 5
## OOB prediction error (MSE): 0.0774
## R squared (OOB):
                            0.2575
##
## Tests for Heterogeneity:
                    tau2_tau2_SE I^2 H^2 Q-test df Q_p
##
                          0.0638 0.0212 74.7160 3.9551 178.7430 40 0.0000
## Raw effect sizes:
## Residuals (after MetaForest): 0.0428 0.0160 66.4833 2.9836 124.2003 40 0.0000
##
##
## Random intercept meta-analyses:
##
                    Intercept se
                                ci.lb ci.ub p
                          0.4693 0.0491 0.3731 0.5655 0.0000
## Raw effect sizes:
## Residuals (after MetaForest): -0.0022 0.0429 -0.0863 0.0820 0.9594
```



### Moderator importance analyses

0.060 -

Number of trees

### Moderation effect plots

### Materials versus immaterial





### DV category







### Mere exposure

### Legal/factual ownership



Loss aversion





## Implicit versus explicit ownership

### **PCurve analysis**

We pre-registered conducting a pourve analysis, yet the nested nature of the meta data and lacking statistical reporting resulted in challenges to that analysis.

We ran an analysis of the studies that reported inferential statistics using <a href="http://shinyapps.org/apps/p-checker/">http://shinyapps.org/apps/p-checker/</a>

These findings should be interpreted with caution.

### Summary

We performed a p-curve analysis (Simonsohn, Nelson, & Simmons, 2014) to quantify the evidence in support of the mere ownership effect. With an estimated power of 77% (90% CI [61%, 88%]), we conclude that based on the combination test (Simonsohn, Simmons, & Nelson, 2015) there is evidential value for the effect (contains evidential value right skew: z = -7.77/-7.58, p < .0001; no evidential value, flatter than 33% power: z = 3.83/8.43, p > .9999). See supplementary materials for further details.

### PCurve analysis graph



**Pcurve results** 

	Binomial Test (Share of results p<.025)	Continuous Test (Aggregate with Stouffer Method)		
		Full p-curve (p's<.05)	Half p-curve (p's<.025)	
<ol> <li>Studies contain evidential value. (Right skew)</li> </ol>	<i>p</i> =.0007	Z=-7.77, p<.0001	Z=-7.58, p<.0001	
<ol> <li>Studies' evidential value, if any, is inadequate. (Flatter than 33% power)</li> </ol>	<i>p</i> =.9083	Z=3.83, p=.9999	Z=8.43, p>.9999	
	Statistical Power			
Power of tests included in p-curve (correcting for selective reporting)	Estimate: 77% 90% Confidence interval: (61% , 88%)			

### **Pcurve interpretation:**

P-Curve analysis combines the half and full p-curve to make inferences about evidential value. In particular, if the half p-curve test is right-skewed with p<.05 or both the half and full test are right-skewed with p<.1, then p-curve analysis indicates the presence of evidential value. This combination test, introduced in Simonsohn, Simmons and Nelson (2015 .pdf) 'Better P-Curves' paper, is much more robust to ambitious p-hacking than the simple full p-curve test is.

Here both conditions are met, indicating evidential value.

Similarly, p-curve analysis indicates that evidential value is inadequate or absent if the 33% power test is p<.05 for the full p-curve or both the half p-curve and binomial 33% power test are p<.1. Here neither condition is met; so p-curve does not indicate evidential value is inadequate nor absent.

### Process

### Search

We pre-registered the use of Google Scholar as the main database (for suitability for metaanalyses see Gehanno, Rollin, & Darmoni, 2013; Martín-Martín, Orduna-Malea, Thelwall, & López-Cózar, 2018; Walters, 2007).

Keyword: "mere ownership" OR "ownership effect" OR "psychological ownership" OR "perceived ownership".

Search pattern: "(Beggan AND 1992) AND ("endowment effect" OR "mere ownership" OR "ownership effect" OR "perceived ownership" OR "sense of ownership" OR "subjective ownership" OR "possession" or "owner") AND (ranking OR valuation OR attractiveness OR price OR pricing OR liking OR value)".

### References:

Gehanno, J. F., Rollin, L., & Darmoni, S. (2013). Is the coverage of Google Scholar enough to be used alone for systematic reviews?. *BMC Medical Informatics and Decision Making*, *13*, 7. DOI: 10.1186/1472-6947-13-7

Martín-Martín, A., Orduna-Malea, E., Thelwall, M., & López-Cózar, E. D. (2018). Google Scholar, Web of Science, and Scopus: a systematic comparison of citations in 252 subject categories. Retrieved August 2018, <u>https://doi.org/10.31235/osf.io/42nkm</u>

Walters, W. H. (2007). Google Scholar coverage of a multidisciplinary field. *Information Processing & Management*, 43, 1121-1132. DOI: 10.1016/j.ipm.2006.08.006

### **Contacting authors**

We contacted all authors of identified publications. We were unable to obtained unpublished manuscripts beyond the identified manuscript through our search process.

### **Contact template**

We are conducting a meta-analysis on the **mere ownership effect** (e.g., Beggan, 1992, JPSP).

We recently completed a search of the literature and identified you as an author who has published work on the topic, and so we are contacting you to ask for your unpublished manuscripts and data to be included in the meta-analysis.

[The study you coauthored to be included: <IDENTIFIED PUBLICATION>]

We are especially interested in any relevant unpublished manuscripts or data that cannot be found using regular literature search.

We would also appreciate references to your other published manuscripts and/or data to make sure we included it in our meta.

If you have unpublished manuscripts, we would appreciate a copy and suggested citation.

Alternatively, for unpublished manuscripts and/or data, the information we require for inclusion is:

- A description of the manipulation and general description of the experimental conditions.
- For each experimental condition:
  - Brief description of the condition
  - Sample size
  - Mean and standard deviation for each of the dependent variables
  - Brief description of the measures/scales were used for the dependent variables, and internal reliabilities if available/relevant.
- Sample characteristics, such as: overall sample size, country, sample type (students, MTurk, general population, etc.), mean age.
- Reference to be used when citing this data.

If you only have raw data that has not yet been analyzed, then we would be happy to help analyze it for inclusion. In such a case, please send us the dataset and a description of the key variables described above relevant for the analysis.

Please send all relevant information and/or data to me at this email <EMAIL>

### Meta-analysis pre-registration

We pre-registered the meta-analysis on the Open Science Framework following a coding pretest and finalization of the coding sheet. Below is the pre-registered plan.

### Introduction

### **Background**

Ownership is the association between a person and an object (Heider, 1958). The sense of ownership manifests itself in the meaning and emotion commonly associated with 'MY' or 'MINE,' and 'OUR' (Pierce, Kostova, & Dirks, 2003). In the mere ownership effect, the psychological ownership of an object increases the perceived value of the object, and people show greater liking for an owned object (Nuttin, 1985, 1987). Beggan (1992) demonstrated that people would evaluate an object more favorably merely because they own it, with participants in the ownership condition rating the object more favorably than participants in the no ownership condition. The effect has since been shown for various other objects (e.g., Morewedge, Shu, Gilbert, & Wilson, 2009), as well as immaterial objects like suggestions (Baer & Brown, 2012) and behaviors (Constable et al., 2016).

### The dependent variable: Evaluation/liking

The effect is typically demonstrated by having participants evaluate, rate, price, or rank an object.

### The independent variable: Ownership

In the mere ownership effect, the independent variable is a manipulation of ownership. The literature refers to ownership using a variety of different terms, such as ownership (Beggan, 1992; Nuttin, 1987), perceived ownership (Peck & Shu, 2009), psychological ownership (Shu & Peck, 2011), sense of ownership, subjective ownership, or subjective sense of endowment (Reb & Connolly, 2007).

There are several types of ownership, such as factual, legal, psychological-subjective (Reb & Connolly, 2007), or implicit ownership such as by merely touching an object, touching an image of an object, or imagining one owns an object (Peck & Shu, 2009; Peck & Shu, 2009; Shu & Peck, 2011; Brasel & Gips, 2014).

In the present meta-analysis, we will focus on perceived and/or psychological ownership. Legal or factual ownership is included only if had affected psychological ownership.

### Goals and research questions

### Goal statement

In this meta-analysis, we aim to examine whether psychological ownership has an impact on evaluation/liking of the object (confidence intervals do not include the null), determine overall effect size, and explore potential factors that moderate the effect.

### Research questions

- 1. Do people evaluate objects more favorably when they perceive they own the object?
- 2. What is the overall effect size for the bias?
- 3. What are factors affecting the bias?

### Hypotheses

### Main hypothesis

The main hypothesis for the meta-analysis main effect:

Hypothesis: Psychological ownership of an object increases evaluation/liking of that object.

### **Moderators**

### Duration of ownership

People adapt to ownership gradually and ownership duration could influence the valuation of the object (Strahilevitz & Loewenstein, 1998; Shu & Peck, 2011). The longer the ownership duration, the stronger the link between self and the owned object. We therefore expect that mere ownership effect would be stronger the longer the people owned the object.

The duration of ownership will be coded as a dichotomous (0 = immediate or recent; 1 = longer ownership; 99 = time is unclear).

*Hypothesis:* The impact of ownership on valuation/liking will be stronger in long compared to short ownership duration.

### Actual ownership vs. Similar/Replica ownership

We expect that mere ownership effect would be stronger when people rate an object they own rather than a similar/replica object.

Object type will be coded (0 = a replica or an object similar to owned object, 1 = an owned object; 99 = unclear).

*Hypothesis:* The impact of ownership on valuation/liking will be stronger when object is owned compared to when the object is similar to or a replica or an owned object.

### Implicit versus explicit ownership

Peck and Shu (2009) stated that "merely touching an object results in an increase in perceived ownership in of that object" (p.434). They also found that ownership imagery can increase non-owners' perceived ownership of an object; participants in ownership imagery condition showed a higher valuation of the object. The power of imagery, however, was eliminated by touching. Physical association between individual and an object can increase the perceived ownership (Beggan & Brown, 1994).

We expect that clearly stated ownership will be stronger than assumed ownership by means of imagination, touch, physical presence, viewing etc.

Emerging type will be coded (0 = implicit ownership (touching, imaginary; presence), 1 = explicit ownership).

*Hypothesis:* The impact of ownership on valuation/liking will be stronger when ownership is explicit compared to when implicit

### Exploratory moderators

### Loss aversion

Loss aversion, first demonstrated by Tversky and Kahneman as "losses loom larger than gains" (Kahneman & Tversky, 1984, p. 346). In mere ownership effect, higher evaluation of an object, according to Morewedge et al. (2009), because people are associated with the object rather than forgoing this object to be painful.

When evaluating an object, although with perceived ownership of the object, people may face potential risk to give it up. Based on Morewedge et al. (2009), we expect that the mere ownership effect will not be affected by loss aversion, meaning - the possibility of a "loss" will not impact the mere ownership effect.

In this case, a loss opportunity is the scenario or the situation indicates that the person is facing the possibility of losing an object, through sale, by potentially giving it up for some gain, etc.

Loss possibility will be coded (0 = no potential loss; 1 = potential loss)

*Hypothesis loss* #1: The impact of ownership on valuation/liking will be different from null (null not included in confidence intervals) even when there is no possibility of loss.

*Competing hypothesis loss aversion #2a:* The impact of ownership on valuation/liking will be even stronger with the possibility of loss.

*Competing hypothesis loss aversion #2b*: The impact of ownership on valuation/liking will not be affected by the possibility of loss (criteria 1: z-test comparisons not significant; criteria 2: 95% confidence intervals overlapping).

### Mere exposure

Zajonc (1968) proved in his experiment that "repeated exposure is a sufficient condition of attitude enhancement" (p.21). The mere ownership effect, however, is not because of mere exposure of an object, and Beggan (1992) had demonstrated that a longer exposure did not lead to more favorable evaluation on an owned object.

Length of exposure will be coded (0 = same length of exposure = 0, 1 = different length of exposure, 99 = unclear), note: for owned and non-owned target

*Hypothesis exposure* #1: The impact of ownership on valuation/liking will be different from null (null not included in confidence intervals) even when there is no exposure.

*Competing hypothesis exposure #2a:* The impact of ownership on valuation/liking will be even stronger with exposure.

*Competing hypothesis exposure #2b*: The impact of ownership on valuation/liking will not be affected by exposure (criteria 1: z-test comparisons not significant; criteria 2: 95% confidence intervals overlapping).

### Material/immaterial objects

We will explore whether the effect is different when ownership is over a material object that participants can see and potentially touch compared to an immaterial object (e.g., arguments, letters).

*Competing hypothesis material #1a:* The impact of ownership on valuation/liking will be even stronger for material objects.

*Competing hypothesis material #1b:* The impact of ownership on valuation/liking will be even stronger for material objects.

*Competing hypothesis exposure #1c*: The impact of ownership on valuation/liking will not be affected by whether the object is material or not.. (criteria 1: z-test comparisons not significant; criteria 2: 95% confidence intervals overlapping).

### Methods

### Description of essential elements

### Design

- Independent variable:
  - Ownership of the object: (owned vs. not owned)
- Dependent variables:
  - Valuation/Liking of the object
- Moderators (see moderators and coding in section A above).

### Search Strategy

- Database: Google Scholar (for suitability for meta-analyses see Walters, 2007; Gehanno, Rollin, & Darmoni, 2013).
- The following search terms were used to search the database systematically.
  - General: mere ownership effect, Beggan
  - Bias names: mere ownership effect, endowment effect, effect of mere ownership, ownership effect, psychological ownership, perceived ownership
  - IV related: perceived ownership / psychological ownership / ownership history / sense of ownership / subjective ownership / subjective sense of endowment / self-object associations / cognitive perspective / emotional attachment / "mine" and "theirs" with ownership / possession / possession enhancement / self-ownership / self-owned / other-ownership / other-owned /
  - DV related: ranking / rank / ratings / rate / valuation / evaluation / attractiveness / attraction / price / money / pricing / favorable/liking
- A scan of reference sections of found articles
- Search for "related articles" and "cited by" Google Scholar options of the identified articles
- Contacting authors of identified articles to ensure full coverage and maximize access to unpublished data and/or manuscripts
- Abstracts, tables and methods sections will be scanned to identify the relevance of a source.

### Eligibility criteria

- Ownership (IV) and measures of evaluation/liking (DV)

### Inclusion criteria

- Experimental designs only
Mere ownership effect meta-analysis: Supplementary

- IV: A clear manipulation of ownership
- IV: Psychological or perceived ownership
- DV: evaluation/ranking/liking.

### Exclusion criteria

- IV related:
  - a. Studies that only ownership (possession) with no perceived ownership measure.
  - b. Studies that that confounds (combine) buying-selling with ownership-no ownership.
  - c. Loss aversion studies
  - d. Studies about the name letter effects: name letter task / name-letter effect / birthday effect / name letter bias / Name–Letter Test / Name letter preferences / birthday-number preferences / self-esteem / familiarity
  - e. Organizational psychological studies
  - f. Studies about trade that involves an evaluation of something other than the target owned
- DV related:
  - a. Studies with ownership as the DV
  - b. Studies with the following as the DV: recall ease, memory, reaction time or implicit evaluation
- Missing statistics are not reported: Studies which do not report crucial measures such as mean or standard needed for the calculation of the effect size deviation will be excluded from the sample.
- Correlational designs

## Procedure for studies selection

Studies collected through the database searches will be assessed for their eligibility based on their titles, abstract and content. One researcher will determine the adequacy of the study for the meta-analysis and a second researcher will do the verification of the results. All the decisions to exclude a study will be documented with reasons.

All decisions on inclusion and exclusion will be documented in any case.

#### Data extraction (coding)

- A coding sheet will be prepared and pre-tested
- The coding sheet and code book are attached
- The coding process for the pretests will be completed by two coders to ensure a high interrater-reliability. Gaps identified will be documented and decisions will be reported in detail.
- Once pre-test is completed, one coder will code all studies, the second coder will verify coding.

## Analysis plan

We will use R and the metafor package the statistical analyses. Given the range of different types of studies and experimental designs, we expect heterogeneity in the sample to be relatively high. Therefore, a random effects model will be used.

All effect sizes will be converted to Cohen 's *d* and standardized to allow for a comparison. Split conditions due to moderators in the original studies will be collapsed to allow for a comparison of the main IV.

Whenever available, we will collect standardized effect sizes directly from authors of original papers. We will check for the accuracy of these analyses based on provided information and details. If unavailable we will use either descriptive statistics or inferential statistics to recompute standardized effect sizes.

All conversions and coding decisions will be documented and the original text will be included in the coding sheet to allow for reproducibility.

Forest plots presenting the effect size of each study will be produced. A meta-analysis will examine the overall main-effect, a meta-regression will be conducted to examine the impact of the described moderators.

Statistical heterogeneity will be determined using the Tau<sup>2</sup> test and quantified using I<sup>2</sup>, which represents the percentage of total variation in a set of studies that is actually due to heterogeneity. (Higgins, Thompson, Deeks, & Altman, 2003). This global meta-analysis will yield a point estimate, confidence interval, and p-value, along with statistics for heterogeneity, assessed using the Q-statistics, and the I^2 statistic. If there is indeed significant heterogeneity, we will explore potential moderators

We will report an analysis for the presence of publication bias, including funnel plots and statistical tests for publication bias (minimum: publication status as a moderator, compare effects for only published findings) and asymmetry (minimum: trim and fill, rank test, Egger's unweighted regression symmetry test).

We will also conduct a p-curve (Simonsohn, Nelson, & Simmons, 2014; Simmons, & Simonsohn, 2017) and a <u>p-uniform test</u> (van Aert & van Assen, 2017).

We aim to share all coding and R code with reviewers and the academic community using the Open Science Framework.

#### **Confirmatory analyses**

We will test for the hypotheses detailed in section A "Hypotheses" using a random-effects meta model.

We plan a-priori to also conduct meta-analyses on subsets of the data, in particular, we will split the data by study design and IV/DV types.

#### Exploratory analyses

The coding sheet includes many other collected variables. We expect that will conduct additional exploratory on some of these variables, but those will be considered exploratory.

We also expect that additional hypotheses and possible coding moderators will be identified as we examine the papers and collected studies.

In both cases, we will explicitly declare these analyses as exploratory.

Answer the following final questions:

Has data collection begun for this project?

- No, data collection has not begun
- Yes, data collection is underway or complete

If data collection has begun, have you looked at the data?

- o Yes
- o No

The (estimated) start and end dates for this project are (optional):

Any additional comments before I pre-register this project (optional):

#### Conflicts of Interest

There are no conflicts of interest to report.

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## **Deviations: Comparison of process versus pre-registration**

We note several deviations from the pre-registration protocol:

We reported Hedge's g rather than the pre-registered Cohen's d, to address reviewer comments we received on a pre-print. The effects and results were quite similar, yet Hedge's g is considered more accurate as it takes into account sample size.

We also note we originally planned to examine publication status as a moderator, yet we were unable to obtain enough unpublished manuscripts or data to conduct such an analysis.

We discussed coding of legal ownership prior to pre-registration, and this was included in the pre-registered coding this, yet the competing hypotheses were left out of the pre-registration. We regard this moderator as exploratory.

We pre-registered the exclusion criteria of "Studies that only ownership (possession) with no perceived ownership measure.". When coding we realized that this was a big vague since we did not state what having such a measure entails. We interpreted this in the broadest sense - that the coders agree that there was a clear indication that participants perceived ownership (a scale measuring psychological ownership, signing an ownership declaration, participants being given an object, etc.).

#### Further challenges and implications

To address the challenges in the mere ownership literature, we resulted to strict inclusion/exclusion criteria to rule out studies on related yet distinct phenomena and to focus solely on mere ownership. Our inclusion/exclusion criteria may have introduced some limitations. First, we excluded experiments that did not explicitly measure psychological ownership. This helped ensure that the studied effect was driven by psychological ownership but not by other factors. However, by doing so, we excluded a large number of studies, which did not explicitly manipulate or measure ownership but may have still captured some aspects of the mere ownership effect. It is possible that the effect of mere ownership is even more robust and generalizable than shown in this meta-analysis. Second, we mainly included published articles. Although we found no clear evidence for a publication bias in this meta-analysis, we cannot rule out possible file-drawer issues and an over-estimation of the effect.