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Research Review

Choice overload: A conceptual review and meta-analysis

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Abstract

Despite the voluminous evidence in support of the paradoxical finding that providing individuals with more options can be detrimental to choice, the question of whether and when large assortments impede choice remains open. Even though extant research has identified a variety of antecedents and consequences of choice overload, the findings of the individual studies fail to come together into a cohesive understanding of when large assortments can benefit choice and when they can be detrimental to choice. In a meta-analysis of 99 observations (N = 7202) reported by prior research, we identify four key factors—choice set complexity, decision task difficulty, preference uncertainty, and decision goal—that moderate the impact of assortment size on choice overload. We further show that each of these four factors has a reliable and significant impact on choice overload, whereby higher levels of decision task difficulty, greater choice set complexity, higher preference uncertainty, and a more prominent, effort-minimizing goal facilitate choice overload. We also find that four of the measures of choice overload used in prior research—satisfaction/confidence, regret, choice deferral, and switching likelihood—are equally powerful measures of choice overload and can be used interchangeably. Finally, we document that when moderating variables are taken into account the overall effect of assortment size on choice overload is significant—a finding counter to the data reported by prior meta-analytic research.

Keywords: Choice overload; Assortment; Decision complexity; Meta-analysis

Contents

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Introduction

The importance of assortment decisions for both retailers and manufacturers has been underscored by numerous research articles, marketing textbooks, and the popular press (Iyengar, 2010; Levy & Weitz, 2006; Schwartz, 2003). Because of its importance, the topic of how product assortment influences consumer choice has generated a substantial amount of interest across different research domains, including economics, analytical and empirical modeling, individual and group decision making, and social psychology (Broniarczyk, 2008; Chernev, 2012; Kahn, 1999; Kahn, Weingarten, & Townsend, 2013; Lancaster, 1990; Lehmann, 1998; Simonson, 1999).

Within assortment research, the topic of the negative consequences of large assortments has attracted a disproportionate amount of interest among researchers. This interest can be attributed largely to the paradoxical finding that variety can be detrimental to choice, which challenged the conventional wisdom that providing consumers with more options always facilitates choice (Iyengar & Lepper, 2000; Reibstein, Youngblood, & Fromkin, 1975). Building on these findings, recent research has moved beyond simply documenting choice overload to identifying its antecedents and boundary conditions. In doing so, researchers have identified a number of important moderators of choice overload, such as attribute alignability (Gourville & Soman, 2005), consumer expectations (Diehl & Poynor, 2010), availability of an ideal point (Chernev, 2003b), personality traits and cultural norms (Iyengar, Wells, & Schwartz, 2006), option attractiveness (Chernev & Hamilton, 2009), decision focus (Chernev, 2006), construal level (Goodman & Malkoc, 2012), time pressure (Haynes, 2009), product type (Sela, Berger, & Liu, 2009), consumer expertise (Mogilner, Rudnick, & Iyengar, 2008), and variety seeking (Oppewal & Koelemeijer, 2005).

Despite the voluminous evidence that large assortments can lead to choice overload, the question of whether and when large assortments are detrimental to choice remains open. Indeed, even though extant research has identified a variety of antecedents and consequences of choice overload, the individual studies use diverse independent and dependent variables. As a result, the findings of these studies fail to come together in a cohesive understanding of whether and when assortment size is likely to lead to choice overload. The goal of our research, therefore, is to identify factors that reliably moderate the impact of assortment size on choice overload and generalize them into an overarching conceptual framework. To achieve this goal, we abstract from the specific variables and manipulations reported in the individual studies to identify the key drivers of choice overload, quantify the effect sizes associated with these factors, and evaluate their impact on choice overload.

Our analysis is organized as follows. First, we discuss the pros and cons of large assortments, focusing on how assortment size influences individual decision processes. This is followed by a conceptual analysis of the antecedents of choice overload, in which we identify four key drivers that are likely to influence the impact of assortment size on choice overload. We then present our methodology in more detail, followed by a summary of our key findings. This research concludes with a discussion in which we highlight our theoretical contributions, discuss the managerial implications, and outline directions for future research.

The pros and cons of large assortments

Offering consumers a large variety of options to choose from can have a two-pronged impact on choice: It can both benefit and hinder choice. The most intuitive benefit, featured prominently in economics research, is that the greater the number of options in the choice set, the higher the likelihood that consumers can find a close match to their purchase goals (Baumol & Ide, 1956; Hotelling, 1929). A related economic explanation of consumer preference for larger assortments involves the greater efficiency of time and effort involved in identifying the available alternatives in the case of one-stop shopping associated with retailers offering larger assortments (Betancourt & Gautschi, 1990; Messinger & Narasimhan, 1997).

It has also been proposed that larger assortments might lead to stronger preferences because they offer option value (Reibstein et al., 1975), allow consumers to maintain flexibility in light of uncertainty about future tastes (Kahn & Lehmann, 1991; Kahneman & Snell, 1992; Kreps, 1979), and accommodate consumers' future variety-seeking behavior (Inman, 2001; Kahn, 1995; Levav & Zhu, 2009; Ratner, Kahn, & Kahneman, 1999; Van Herpen & Pieters, 2002). It has further been argued that consumers might experience additional utility simply from having multiple items in the choice set because it creates the perception of freedom of choice (Kahn, Moore, & Glazer, 1987), enhances the enjoyment of shopping (Babin, Darden, & Griffin, 1994), and strengthens overall choice satisfaction (Botti & Iyengar, 2004).

Finally, it has been proposed that larger assortments influence consumer preferences by reducing the uncertainty of whether the choice set at hand adequately represents all potentially available options. Prior research has shown that consumers may delay their purchasing because they are uncertain about the degree to which the available set is representative of the entire roster of possible options (Greenleaf & Lehmann, 1995; Karni & Schwartz, 1977). To illustrate, consumers might feel more confident when selecting from a retailer that offers a larger assortment because it is less likely that a potentially superior alternative is not represented in the available choice set.

Despite their multiple benefits, larger assortments have a number of important drawbacks. Prior research has shown that the benefits of greater variety are, at least partially, offset by a corresponding increase in the cognitive costs associated with choosing from a larger assortment. In this context, it has been shown that reducing the size of an assortment can actually increase the purchase likelihood from that assortment. For example, it was shown that consumers were more likely to make a purchase when presented with an assortment comprising 6 flavors of jam than with an assortment comprising 24 flavors (Iyengar & Lepper, 2000). Similar findings have been documented in a variety of product categories, such as chocolates (Berger, Draganska, & Simonson, 2007; Chernev, 2003b), consumer electronics (Chernev, 2003a), and mutual funds (Huberman, Iyengar, & Jiang, 2007; Ketcham, Lucarelli, Miravete, & Roebuck, 2012; Morrin, Broniarczyk, Inman, & Broussard, 2008).

Recent research also has argued that consumer preference for larger assortments is likely to be subject to diminishing returns because the marginal benefits from each additional alternative tend to decrease with the increase in assortment size (Chernev & Hamilton, 2009; Oppewal & Koelemeijer, 2005). Given that the increase in benefits accrues at a decreasing rate, at some point it is likely to be offset by the additional costs of evaluating the available alternatives (Roberts & Lattin, 1991). Thus, it has been shown that the probability of purchasing a brand, reflected in the brand's market share, tends to decrease after the product line achieves a certain size (Draganska & Jain, 2005).

It has further been argued that larger assortments tend to shift consumers' ideal points in a way that makes them more difficult to attain (Chernev, 2003b; Schwartz et al., 2002). Larger assortments have also been found to inflate consumers' expectations of finding their ideal option in the available assortment and the degree of preference match they can achieve (Diehl & Poynor, 2010). Consequently, it has been proposed that choices from larger assortments can lead to disconfirmation of consumer expectations, resulting in greater choice deferral and lower satisfaction with the chosen option.

In this research we focus on the negative consequences of large assortments, specifically those factors that are likely to influence whether and how larger assortments will produce choice overload. We discuss the antecedents and consequences of choice overload in more detail in the following sections.

Choice overload in consumer decision making

We start by discussing prior research examining the impact of assortment size on choice overload to underscore the importance of developing a theory-based approach to generalizing the findings of the individual studies. We then propose a conceptual model that identifies four key factors that influence the impact of assortment size on choice overload.

Choice overload in individual decision making

The term choice overload—also referred to as overchoice—is typically used in reference to a scenario in which the complexity of the decision problem faced by an individual exceeds the individual's cognitive resources (Simon, 1955; Toffler, 1970). In this research, our main focus is on a particular type of choice overload—one in which the decision complexity is caused, at least partially, by the (large) number of available decision alternatives (Iyengar & Lepper, 2000).

Because choice overload is a mental construct describing the subjective state of the decision maker, it cannot be directly observed; instead, it is reflected in a series of objective indicators, which, in turn, are used to measure choice overload. In this context, two types of indicators of choice overload can be identified: process-based indicators describing the subjective state of the decision maker and outcome-based indicators reflecting the decision maker's observable behavior.

As a subjective state, choice overload is captured by changes in consumers' internal states, such as decision confidence, satisfaction, and regret, whereby higher levels of choice overload are likely to produce lower levels of satisfaction/confidence and higher levels of regret. Thus, compared to individuals not experiencing choice overload, those experiencing overload are (1) less likely to be satisfied with their decisions (Botti & Iyengar, 2004), (2) less confident that they have chosen the best option (Haynes, 2009), and (3) prone to more post-decision regret (Inbar, Botti, & Hanko, 2011).

Behavioral consequences of choice overload, on the other hand, include factors that capture consumer actions such as the likelihood of deferring choice, the likelihood of reversing an already made choice, the preference for larger assortments, and the nature of the ultimately chosen option. In this context, greater levels of choice overload are associated with greater probability of choice deferral, greater switching likelihood, decreased preference for larger assortments, and greater preference for easily justifiable options. Thus, compared to individuals not experiencing choice overload, those experiencing overload are (1) less likely to make a choice from a particular assortment (Iyengar & Lepper, 2000), (2) more likely to reverse their initial choice (Chernev, 2003b), (3) less likely to display a preference for larger assortments (Chernev, 2006), and (4) more likely to choose an option that can be easily justified (Sela et al., 2009).

Note that the above indicators of choice overload do not represent a complete list of all viable measures of choice overload; rather, these are the measures that represent the most common decision scenarios and have been frequently utilized by prior research.

Conceptualizing the impact of assortment size on choice overload

Recent assortment research has identified a number of important antecedents and consequences of choice overload. While this plethora of predictors and measures facilitates understanding the impact of assortment size on choice overload, it also complicates generalization of the findings of the individual studies because different experiments use diverse independent and dependent variables. Indeed, whereas numerous studies identify a variety of factors that are likely to influence choice overload—including attribute alignability, attribute complementarity, ideal point availability, option attractiveness, consumer expertise, variety seeking, time pressure, product type, and need for cognition—convergence of these findings is difficult to achieve because there is little overlap between the study-specific independent variables. In the same vein, different studies use different dependent variables to measure choice overload, including satisfaction, confidence, the likelihood of deferring choice, and the likelihood of switching to an alternative option. Therefore, in order to make meaningful cross-study comparisons, one must generalize the study-specific moderators and measures into theoretically meaningful constructs and examine whether and how these constructs influence choice overload.

Generalizing the effects of study-specific factors involves identifying higher level constructs and linking each study factor to one of these constructs. Accordingly, in this research we identify four such constructs and then test their validity by examining the ability of these constructs to explain the variance in prior studies. On a more general level, we view the impact of assortment size on consumer decision processes as a function of two types of factors: (1) extrinsic factors that define the decision problem and are similar across individuals and (2) intrinsic factors that reflect individuals' idiosyncratic knowledge and motivation and are particular to each decision maker.

Building on prior research in the domain of behavioral decision theory and choice, we divide extrinsic factors into two categories: *task factors* and *context factors* (Payne, Bettman, & Johnson, 1993). Here, task factors describe the general structural characteristics of the decision problem, including number of alternatives, number of attributes describing each option, time constraints, decision accountability, and information presentation mode. In contrast, context factors describe the aspects of the decision associated with the particular values of the choice options, including the similarity and the overall attractiveness of the alternatives. In this research we refer to the task factors and their impact on choice overload as *decision task difficulty* and to the context factors as *choice set complexity*.

Unlike extrinsic factors, which refer to the characteristics of the decision problem and are similar across individuals, intrinsic factors are particular to the decision maker. Two specific factors have been discussed in prior research examining the impact of assortment size on choice overload: preference uncertainty and decision goals. Here, preference uncertainty refers to the degree to which individuals have articulated preferences with respect to the decision at hand and includes factors such as the level of product-specific expertise and the availability of an articulated ideal point (Chernev, 2003b). The decision goal, on the other hand, reflects the degree to which a consumer's goal involves choosing among the options in a given assortment (Chernev & Hamilton, 2009).

Our theorizing is summarized in Fig. 1. The four factors discussed above—decision task difficulty, choice set complexity, preference uncertainty, and decision goal—comprise the key moderators that could potentially influence the impact

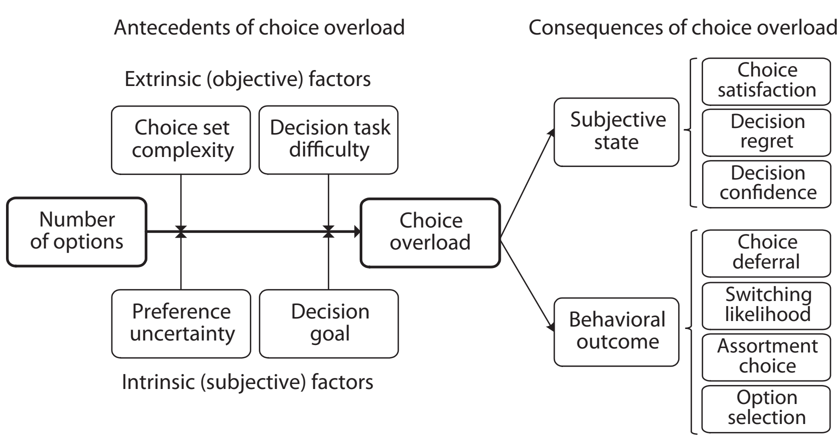


Fig. 1. Conceptual model of the impact of assortment size on choice overload. Note.—The four antecedents of choice overload are operationalized as follows: (1) The *complexity of the choice set* describes the aspects of the decision set associated with the particular values of the choice options: the presence of a dominant option in the choice set, the overall attractiveness of the options in the choice set, and the relationship between individual options in the decision set (alignability and complementarity); (2) The *difficulty of the decision task* refers to the general structural characteristics of the decision problem: time constraints, decision accountability, and number of attributes describing each option; (3) *Preference uncertainty* refers to the degree to which individuals have articulated preferences with respect to the decision at hand and has been operationalized by two factors: the level of product-specific expertise and the availability of an articulated ideal point; and (4) The *decision goal* reflects the degree to which individuals aim to minimize the cognitive effort involved in making a choice among the options contained in the available assortments and is operationalized by two measures: decision intent (buying vs. browsing) and decision focus (choosing an assortment vs. choosing a particular option). In this context, we expect higher levels of decision task difficulty, greater choice set complexity, higher preference uncertainty, and a more prominent, effort-minimizing goal to produce greater choice overload.

of assortment size on choice overload. Choice overload is then measured as a subjective state of the decision maker (satisfaction, confidence, and regret) and/or as a specific behavioral outcome (choice deferral, switching likelihood, assortment choice, and option selection).

We discuss the impact of each of the four factors outlined in Fig. 1 in more detail and make directional predictions regarding their impact in the following sections. We then proceed to test the validity of the proposed model by examining its ability to account for the findings reported by the existing empirical data. When discussing the specific measures encompassed by each of the above factors, we focus on measures that have been used by prior research and, thus, are available for the purposes of meta-analysis. In the general discussion section, we address some of the additional measures that are likely to moderate the impact of assortment on choice overload but have not yet gained empirical support.

Decision task difficulty

The difficulty of the decision task reflects the general structural characteristics of the decision problem without influencing the values of the particular choice options (Payne et al., 1993). Prior research has argued that a number of decision-task factors—including *time constraints*, *decision accountability*, *number of attributes describing each option, and presentation format*—are likely to influence the impact of assortment size on choice overload. We discuss the effects of these three factors on choice overload in more detail below.

One decision task factor that is likely to influence the impact of assortment size on choice overload is the imposition of *time constraints*. Specifically, it has been argued that an external limit on the length of the evaluation period increases the cognitive challenge associated with making a choice and forces consumers to engage in a less systematic evaluation of the available alternatives (Bettman, Luce, & Payne, 1998). This nonsystematic processing of the available alternatives, in turn, has been shown to lower consumer satisfaction with the chosen alternatives and diminish consumers' confidence in their decisions (Dhar & Nowlis, 1999; Haynes, 2009). It has further been shown that the impact of the assortment size on decision regret is a function of the time pressure experienced by individuals, such that the subjective feeling of being rushed accounts for greater regret when choosing from larger sets (Inbar et al., 2011).

Another decision task factor that could influence the impact of assortment size on choice overload is *decision accountability* (e.g., requiring consumers to justify their choices). Related research has shown that preference for larger assortments tends to increase when consumers expect to have to justify their choice of an assortment to others but tends to decrease when consumers have to justify the choice of a particular option from the available assortments (Chernev, 2006; Ratner & Kahn, 2002; Scheibehenne, Greifeneder, & Todd, 2009). It has further been shown that when making a choice from a given assortment, decision accountability can decrease the likelihood of making a choice from larger (relative to smaller) assortments (Gourville & Soman, 2005).

Yet another decision task factor likely to influence the impact of assortment size on choice overload is the *number of attributes describing the available options* (Chernev, 2003b; Greifeneder, Scheibehenne, & Kleber, 2010; Hoch, Bradlow, & Wansink, 1999). Specifically, it has been argued that the more dimensions on which products are differentiated, the more complex a choice becomes since consumers need to sift through additional information to compare the options before ultimately making a choice. Thus, choosing from a set of items described along a single dimension (e.g., color) is likely to be less cognitively taxing than choosing from a set of items described along multiple attributes (e.g., color, design, durability). In addition to increasing the amount of information that needs to be evaluated, increasing the number of attributes describing the available options also increases the number of dimensions on which each of the available options is inferior to the other options in the choice set, further complicating choice.

Prior research has further argued that the impact of assortment size on choice overload can also be influenced by the *presentation format* of the individual options. Thus, ordering options in a given assortment has been found to decrease search costs, thus decreasing the difficulty of choosing an item from larger assortments (Diehl, 2005; Diehl, Kornish, & Lynch, 2003; Mogilner et al., 2008). In the same vein, research by Hoch et al. (1999) has documented that consumers are more satisfied with and are likely to choose assortments that offer a high variety of options displayed in an organized rather than random manner. Recent research has further shown that choice overload is likely to be a function of whether the assortments are presented in a visual or verbal format, whereby visual presentation is associated with less systematic processing and is more likely to lead to overload in the case of larger assortments compared to verbal (text-based) presentation (Townsend & Kahn, 2014).

Building on the above findings, we expect that decision task difficulty can have a significant impact on the way assortment size influences choice overload. Specifically, we expect that higher levels of decision task difficulty—operationalized in terms of time constraints, decision accountability, number of attributes describing each option, and the complexity of the presentation format—will lead to greater choice overload.

Choice set complexity

The complexity of the choice set reflects the aspects of the decision task that influence the values of the particular choice options without necessarily influencing the structural aspects of the decision problem at hand (Payne et al., 1993). Prior research has argued that a number of choice-set-complexity factors, including the *presence of a dominant option*, the *overall attractiveness of the choice options*, as well as the *alignability* and the *complementarity of the options*, are likely to influence the impact of assortment size on choice overload. We discuss the effects of these factors on choice overload in more detail below.

One of the determinants of the complexity of the choice set is whether it contains a dominant option—that is, an option superior to all other available options for a given individual (Huber, Payne,

& Puto, 1982). In this context, it has been shown that consumers are more likely to make a purchase from an assortment when it contains a *dominant option* than when such an option is absent (Boatwright & Nunes, 2001; Broniarczyk, Hoyer, & McAlister, 1998; Chernev, 2006; Oppewal & Koelemeijer, 2005). Similarly, adding an inferior option that enhances the dominance of one of the existing options has been shown to increase the likelihood that a choice will be made from an assortment (Dhar, 1997), whereas adding equally attractive options has been reported to have the opposite effect, increasing the likelihood that choice will be deferred (Dhar, 1997; Dhar & Simonson, 2003; Tversky & Shafir, 1992). Furthermore, adding an inferior option has been shown to increase the share of the dominant option, a finding commonly referred to as the attraction effect (Huber et al., 1982; Simonson, 1989; Simonson & Tversky, 1992). Thus, the finding that consumers are more likely to make a purchase from an assortment containing a dominant option is consistent with the notion that the availability of a dominant option decreases choice overload, consequently increasing probability of purchase.

The impact of assortment size on choice overload is also influenced by the *attractiveness of the choice options*. Some assortments comprise options that are of higher quality and, hence, are likely to be perceived as more attractive, whereas other assortments comprise options that are of lower quality and are likely to be perceived as relatively less attractive. In this context, prior research has argued that option attractiveness influences the way consumers choose among assortments, such that smaller assortments are preferred to larger ones when these assortments are composed of more attractive rather than less attractive options (Chernev & Hamilton, 2009). Thus, consumers are more likely to prefer smaller assortments when these assortments are curated to include the most attractive options from larger assortments.

Prior research has further shown that the impact of assortment size on choice overload is a function of the *alignability* of the attributes describing the options in the assortment. Here alignability describes the relationships among the attribute levels of the options in a given assortment. Nonalignable attributes describe a scenario in which a given feature is present in one of the options and absent in the others, whereas alignable attributes describe a scenario in which objects have different (but nonzero) levels of a given attribute (Markman & Medin, 1995). In this context, it has been argued that increasing the size of assortments whose options are differentiated by alignable attributes reportedly can lead to an increase in purchase probability from that assortment, whereas increasing the size of assortments differentiated by options with nonalignable attributes has been shown to have the opposite effect of decreasing purchase probability (Gourville & Soman, 2005). Moreover, research has linked attribute alignability to satisfaction with choice, following an inverted U-shape for options differentiated on nonalignable (but not alignable) attributes (Griffin & Broniarczyk, 2010).

A related argument has been advanced by Chernev (2005), who shows that the impact of assortment size on choice overload is also a function of *feature complementarity*, defined as the extent to which features complement one another with respect to their ability to fulfill a particular consumer need. Thus, increasing a product assortment by adding options differentiated by complementary features tends to lower the attractiveness of all alternatives in that assortment. In this context, purchase likelihood from a given assortment is shown to be a function of the complementarity of its options, such that choice deferral is greater for assortments comprising complementary rather than noncomplementary options. Furthermore, increasing assortment size by adding noncomplementary options tends to increase purchase likelihood from the assortment, whereas increasing assortment size by adding complementary options tends to decrease purchase likelihood from the assortment.

The above research suggests that choice set complexity can have a significant impact on whether and how assortment size influences choice overload. Specifically, we expect that higher levels of choice set complexity—operationalized in terms of the presence of a dominant option, as well as the overall attractiveness, alignability, and complementarity of the choice options—will lead to greater choice overload.

Preference uncertainty

Preference uncertainty refers to the degree to which individuals have articulated preferences with respect to the decision at hand, meaning that they understand the benefits of the choice options and can prioritize these benefits when trading off the pros and cons of the choice options (Chernev, 2003b). This factor has been operationalized in prior research in two ways: in terms of the level of product-specific *expertise* and in terms of the availability of an *articulated ideal point*.

Research has argued that the impact of assortment size on choice overload is a function of consumers' *expertise* and, in particular, their knowledge about the attributes and attribute levels describing the available alternatives. In this context, it has been shown that for consumers who are unfamiliar with the product category, choices from larger assortments are more likely to lead to choice deferral and weaker preferences for the selected alternative than choices from smaller assortments. In contrast, for expert consumers, the impact of assortment size is reversed, leading to greater likelihood of choice deferral and weaker preferences for the chosen alternative in the context of smaller rather than larger assortments (Chernev, 2003b; Mogilner et al., 2008; Morrin, Broniarczyk, and Inman, 2012).

Choice overload is also likely to be a function of the degree to which consumers have an *articulated ideal point*. Whereas product expertise implies knowledge of the product category and the product at hand, the availability of an articulated ideal point implies that consumers have well-defined preferences within a given category. Thus, the availability of an ideal point goes beyond product expertise and implies a hierarchical attribute structure and already articulated attribute trade-offs (Carpenter & Nakamoto, 1989; Dhar, 1997; Wansink, Kent, & Hoch, 1998). Because the articulation of attribute trade-offs is essential for choice, the availability of an ideal attribute combination effectively increases the compatibility of consumer preference structures with the decision task, thus reducing the structural complexity of the decision. Therefore, preferences based on an articulated ideal point will be more effective in reducing the structural complexity of the decision than will preferences that do not involve an ideal point. Because large assortments are generally associated with more complex decisions, the differential impact of ideal point articulation is likely to be more pronounced for larger than for smaller assortments (Chernev, 2003b). Accordingly, consumers with an available ideal point are more likely to have stronger preferences for and make a purchase from larger assortments than consumers without an available ideal point, who are more likely to have stronger preferences for and make a purchase from smaller assortments.

Building on the above research, we expect that individuals' preference uncertainty can influence the impact of assortment size on choice overload. Specifically, we predict that a greater degree of choice overload will result from higher levels of preference uncertainty, defined in terms of the level of product-specific expertise and the availability of an articulated ideal point.

Decision goal

The decision goal reflects the degree to which individuals aim to minimize the cognitive effort involved in making a choice among the options contained in the available assortments. The importance of the decision goal as a factor contributing to choice overload is underscored by the fact that overload is, at least in part, driven by consumers' inability to make a tradeoff among the available options—an effect that is more pronounced for choices from larger than from smaller assortments (Chernev, 2003b). Whereas most assortment research has focused on scenarios in which consumers' goals involve making a choice from the available assortments, this is not always the case, and on many occasions consumer decisions do not involve such choices. In this research, we identify three factors that could lead to scenarios in which consumers might not aim to minimize cognitive effort: *decision intent* (buying vs. browsing), *decision focus* (choosing an assortment vs. choosing a particular option), and *level of construal* (high vs. low).

Consumers' *decision intent* reflects whether they approach the decision task with the explicit goal of making a choice (i.e., buying) or merely to consider the available alternatives without the explicit goal of selecting one or more of the available options (i.e., browsing). Indeed, on some occasions, consumers approach the available assortments with the cognitive goal of learning more about the available options and/or their own preferences. In the same vein, consumers might approach the available assortments with the affective goal of deriving pleasure from the evaluation process itself (Kahn & Ratner, 2005; Kahn & Wansink, 2004). In this context, one can argue that decisions associated with a browsing goal are less likely to lead to cognitive overload compared with decisions that involve the goal of making a choice.

Consistent with this line of reasoning, prior research has shown that consumers who evaluate assortment options with a goal of browsing rather than making a choice are less likely to face cognitive overload when presented with more extensive assortments (Chernev & Hamilton, 2009; Choi & Fishbach, 2011; Hamilton & Chernev, 2010). In the same vein, research has shown that experienced consumers who seek variety are more satisfied with larger assortments than with smaller ones (Oppewal & Koelemeijer, 2005). Indeed, because the search itself is utility enhancing for these consumers, there are fewer (if any) negative consequences associated with larger assortments and, hence, less likelihood of choice overload.

Even when consumers approach assortments with the intent of making a choice, their decision might not necessarily involve choosing among the available options but might involve choosing among the assortments themselves (Arentze, Oppewal, & Timmermans, 2005; Kahn & Lehmann, 1991). Because choices among assortments do not necessarily involve evaluating the individual options in these assortments and trading off their pros and cons, larger assortments are not necessarily associated with greater cognitive effort and hence choice overload. Therefore, one can argue that the impact of assortment size on choice overload is likely to be a function of consumers' *decision focus* and, specifically, whether they consider choosing among assortments or choosing an item from a given assortment.

In this context, focusing consumer attention on choosing an assortment tends to enhance the benefits of variety while de-emphasizing the cognitive costs associated with making a choice, thus strengthening the preference for larger assortments. In contrast, focusing individuals' attention on choosing a specific item from a given assortment tends to make the difficulty of choosing from larger assortments more prominent, consequently increasing the preference for smaller assortments (Chernev, 2006; see also Sood, Rottenstreich, & Brenner, 2004; Huffman & Kahn, 1998). Therefore, varying the decision focus can systematically vary the choice overload experienced by consumers, such that larger assortments are more likely to lead to choice overload when the goal involves choosing an option from an assortment rather than choosing among assortments.

Research examining choice among assortments has further shown that the impact of assortment size on choice overload is a function of the *level of construal*. Specifically, the construal-level theory predicts that the way individuals conceptualize the decision process—as a high-level, abstract, and distant process or a low-level, concrete, and proximate process—can significantly influence decision outcomes (Trope & Liberman, 2010). In this context, it has been shown that varying psychological distance can influence consumers' awareness of the difficulty of the decision task (choice feasibility), which in turn is likely to influence their preference for larger versus smaller assortments (Goodman & Malkoc, 2012).

The above reasoning suggests that the impact of assortment size on choice overload is likely to be a function of individuals' decision goals. Specifically, we expect that choice overload is likely to be more pronounced in cases when consumers aim to minimize the effort involved in making a choice from a given assortment.

Method

The data

The data utilized in the meta-analysis were collected through a literature review of articles published in refereed psychology and marketing journals. We also examined the recently published review papers in the domain of choice overload (Broniarczyk, 2008; Chernev, 2012; Scheibehenne, Todd, & Greifeneder, 2010) to ensure comprehensive coverage of the published data. Given our focus on identifying factors that moderate the impact of assortment size on choice overload, we sought out studies that (1) included assortment size as an independent variable and (2) included a dependent variable that has been linked by prior research to choice overload (e.g., choice satisfaction, decision confidence, decision regret, choice deferral, switching likelihood, assortment choice, and option selection).

Our units of analysis are the individual conditions of the studies reported in the relevant articles—an approach common for meta-analyses (Becker, 2001; Rosenthal, 1995; Sánchez-Meca, Marín-Martínez, & Chacón-Moscoso, 2003). For example, a study featuring a 2 (moderator: high vs. low) × 2 (assortment size: high vs. low) design yields two meta-analytic observations—one for each level of the moderating factor. In the same vein, an article reporting three studies, each featuring a 2 × 2 design, yields six observations (3 studies × 2 conditions).

Overall, the meta-analysis includes 99 observations derived from 53 studies published in 21 articles across 7202 participants. Consistent with our theorizing, the observations were assigned to one of the four experimental factors: choice set complexity, decision task difficulty, preference uncertainty, and decision goal. Specifically, the choice set complexity factor involved 18 observations across 1336 respondents, the decision task difficulty factor involved 17 observations across 1409 respondents, the preference uncertainty factor involved 22 observations across 1092 respondents, and the decision goal factor involved 24 observations across 1778 respondents. In addition, there were 18 observations across 1587 respondents that captured only the main effect of assortment size and, thus, did not involve any moderating factors.

Each observation was also coded to reflect the corresponding dependent variable—satisfaction/confidence, decision regret, choice deferral, switching likelihood, assortment choice, and option selection. Because we were interested in estimating the differential impact of choice overload using different metrics, in studies with multiple dependent variables we recorded each dependent variable as a separate observation. All coding directly followed from the information reported by the authors of the individual studies.

A summary of the experimental data is given in Table 1, which outlines the underlying observations, studies, and articles and indicates how each observation corresponds to our conceptual model, presented in Fig. 1. A detailed overview of the individual observations and the corresponding papers and an outline of the rationale for their selection are offered in Appendix A.

The model

We use a theory-based meta-analytic approach (Becker, 2001) to explore the drivers of choice overload. This approach facilitates both quantifying and testing the effects of theoretically derived moderators. The key benefit of this approach is that rather than focusing on the presence or absence of a main effect of assortment size on choice overload, it enables us to validate our conceptual model by evaluating the relative impact of the four conceptually derived antecedents of choice overload. This is important because the published studies document choice overload in some conditions but not in others. In this context, we aim to test the validity of our conceptual model with respect to its ability to account for the conceptual moderators that have been advanced and tested in prior research.

As informed by our conceptual model, we identify four factors—choice set complexity, decision task difficulty, preference uncertainty, and decision goal—that are likely to influence the impact of assortment size on choice overload. We further operationalize choice overload by measuring choice deferral, switching likelihood, option selection, assortment choice, decision regret, and satisfaction/confidence (given the low number of studies measuring satisfaction and confidence, we combined these two factors into a single variable).

To integrate the individual studies into a format suitable for meta-analysis, we transformed the differences between the small and large assortments within individual studies into effect size measures represented by Cohen's *d*—an approach commonly used in meta-analysis (Cohen, 1988). In this context, a positive *d*-value is associated with a negative impact of larger assortments (choice overload), whereas a negative *d*-value is associated with a positive impact of larger assortments. For the decision outcomes measured on a continuous scale (e.g., regret, satisfaction, and confidence), Cohen's *d* is calculated as the difference between the two means divided by the combined standard deviation[1] (Cohen, 1988). For the decision outcomes measured on a binary scale (choice deferral, switching likelihood, option selection), Cohen's *d* is calculated using the arcsine transformation[2] (Lipsey & Wilson, 2001; Scheibehenne et al., 2010). Using the log-odds ratio, which has been shown to perform well for binary outcomes (Sánchez-Meca et al., 2003) yielded nearly identical results.

To illustrate, consider the data by Iyengar and Lepper (2000; Study 3), which involves both continuous and binary measures. Specifically, the data measured on a continuous scale show that participants in the small assortment condition were more satisfied than participants in the large assortment condition ($M = 6.28$, $SD = 0.54$ vs. $M = 5.46$, $SD = 0.82$), and the data measured on a binary scale show that participants given the smaller assortment condition were more likely to make a purchase compared to those given the larger assortment (16 out of 33, versus 4 out of 34). Accordingly, we calculate $d = 1.18$ for satisfaction and $d = .84$ for the choice likelihood measure,[3] whereby the positive *d* indicates the presence of choice overload.

To analyze the data, we use a meta-analytic model that regresses effect sizes (Cohen's *d* effects) of the explanatory variables on the observed measures of choice overload. Given the nested nature of the data (99 observations derived from 53 studies published in 21 separate articles), we use a three-level

[1] $d = \frac{\text{mean}_{small} - \text{mean}_{large}}{s}$, where $s = \sqrt{\frac{(n_{small}-1)*s^2_{small} + (n_{large}-1)*s^2_{large}}{n_{small}+n_{large}-2}}$.

[2] $d = 2 * \text{arcsine}\sqrt{P_{small}} - 2 * \text{arcsine}\sqrt{P_{large}}$, where P_{small} and P_{large} are the proportions of participants who make a selection from each assortment.

[3] $d = \frac{6.28-5.46}{.696} = 1.18$, where $s = \sqrt{\frac{(33-1)*.54^2+(34-1)*.82^2}{33+34-2}} = .696$ and $d = 2 * \text{arcsine}\sqrt{\frac{16}{33}} - 2 * \text{arcsine}\sqrt{\frac{4}{34}} = 1.54 - .70 = .84$.

Table 1
Overview of the studies included in the Meta-Analysis.

Author/article	Study	ID	Product category	Sample size	Moderators of choice overload (independent variables): Conceptual factor	Factor level	Condition	Indicators of choice overload (dependent variables)	Assortment size: Small	Large	Effect size: Cohen's d	S^2	Weight
Iyengar and Lepper (2000), "When Choice Is Demotivating: Can One Desire Too Much of a Good Thing?"	1	1	Jam	249	No moderators	–	–	Choice deferral	6	24	0.82	0.02	0.03
	2	2	Essays	193	No moderators	–	–	Choice deferral	6	30	0.30	0.02	0.02
	2	3	Essays	193	No moderators	–	–	Satisfaction	6	30	0.44	0.02	0.02
	3	4	Chocolate	67	No moderators	–	–	Choice deferral	6	30	0.84	0.06	0.01
	3	5	Chocolate	67	No moderators	–	–	Satisfaction	6	30	1.18	0.07	0.01
Chernev (2003a), "Product Assortment and Individual Decision Processes."	1	6	Chocolate	50	Preference uncertainty	Low	Ideal point available	Option selection	8	20	−1.34	0.08	0.01
	1	7	Chocolate	51	Preference uncertainty	High	Ideal point not available	Option selection	8	20	−0.37	0.08	0.01
	1	8	Chocolate	50	Preference uncertainty	Low	Ideal point available	Satisfaction	8	20	0.15	0.08	0.01
	1	9	Chocolate	51	Preference uncertainty	High	Ideal point not available	Satisfaction	8	20	0.91	0.09	0.01
Chernev (2003b), "When More Is Less and Less Is More: The Role of Ideal Point Availability and Assortment in Consumer Choice."	1	10	Chocolate	45	Preference uncertainty	Low	Ideal point available	Switching likelihood	4	16	−0.36	0.09	0.01
	1	11	Chocolate	43	Preference uncertainty	High	Ideal point not available	Switching likelihood	4	16	0.72	0.09	0.01
	2	12	Chocolate	34	Preference uncertainty	Low	Ideal point available	Switching likelihood	4	16	−0.35	0.12	0.00
	2	13	Chocolate	41	Preference uncertainty	High	Ideal point not available	Switching likelihood	4	16	0.57	0.10	0.01
	3	14	Assorted products	81	Preference uncertainty	Low	Ideal point available	Switching likelihood	6	24	−0.29	0.05	0.01
	3	15	Assorted products	86	Preference uncertainty	High	Ideal point not available	Switching likelihood	6	24	0.47	0.05	0.01
	4	16	Assorted products	84	Preference uncertainty	Low	Ideal point available	Switching likelihood	6	24	−0.13	0.01	0.01
	4	17	Assorted products	84	Preference uncertainty	High	Ideal point not available	Switching likelihood	6	24	0.16	0.01	0.01
	4	18	Assorted products	84	Preference uncertainty	Low	Ideal point available	Satisfaction	6	24	−0.30	0.01	0.01
	4	19	Assorted products	84	Preference uncertainty	High	Ideal point not available	Satisfaction	6	24	0.17	0.01	0.01
Chernev (2005), "Feature Complementarity and Assortment in Choice."	2	20	MP3 players, toothpaste	88	Choice set complexity	Low	Noncomplementary options	Choice deferral	2	5	−0.33	0.02	0.01
	2	21	MP3 players, toothpaste	88	Choice set complexity	High	Complementary options	Choice deferral	2	5	0.31	0.02	0.01
Gourville and Soman (2005), "Overchoice and Assortment Type: When and Why Variety Backfires."	1	22	Microwave ovens	120	Choice set complexity	Low	Alignable options	Option selection	2–3	5–6	−0.43	0.03	0.02
	1	23	Microwave ovens	120	Choice set complexity	High	Nonalignable options	Option selection	2–3	5–6	0.37	0.03	0.02
	2	24	Camera	102	Decision task difficulty	Low	Small number of attributes	Option selection	2	3	−0.59	0.04	0.01
	2	25	Camera	102	Decision task difficulty	High	Large number of attributes	Option selection	2	3	0.48	0.04	0.01
	3	26	Golf balls	240	Decision task difficulty	Low	No justification required	Option selection	2	3	−0.42	0.02	0.03
	3	27	Golf balls	240	Decision task difficulty	High	Justification required	Option selection	2	3	0.27	0.02	0.03
Oppewal and Koelemeijer (2005), "More Choice Is Better: Effects of Assortment Size and Composition on Assortment Evaluation."	1	28	Flowers	741	Decision (effort-minimizing) goal	Low	Browsing	Satisfaction	5–6	11–12	−0.82	0.00	0.09
Chernev (2006), "Decision Focus and Consumer Choice among Assortments."	1	29	Vending machines	57	Decision (effort-minimizing) goal	Low	Assortment selection	Assortment choice	6	36	−2.61	0.04	0.01
	1	30	Vending machines	54	Decision (effort-minimizing) goal	High	Product selection	Assortment choice	6	36	−0.60	0.04	0.01
	2	31	Chocolate	46	Decision (effort-minimizing) goal	Low	Assortment selection	Assortment choice	24	88	−2.55	0.04	0.01
	2	32	Chocolate	92	Decision (effort-minimizing) goal	High	Product selection	Assortment choice	24	88	−1.48	0.02	0.01
	3	33	Pens	52	Decision (effort-minimizing) goal	Low	Assortment selection	Assortment choice	12	60	−2.47	0.04	0.01
	3	34	Pens	36	Decision (effort-minimizing) goal	High	Product selection	Assortment choice	12	60	−1.31	0.06	0.00
	3	35	Pens	52	Decision (effort-minimizing) goal	Low	Assortment selection	Satisfaction	12	60	−1.52	0.05	0.01
	3	36	Pens	36	Decision (effort-minimizing) goal	High	Product selection	Satisfaction	12	60	−0.82	0.06	0.00
	4	37	Hotel resorts	41	Decision (effort-minimizing) goal	Low	Assortment selection	Assortment choice	6	24	−2.51	0.05	0.01
	4	38	Hotel resorts	44	Decision (effort-minimizing) goal	High	Product selection	Assortment choice	6	24	−0.65	0.05	0.01
	4	39	Hotel resorts	41	Decision (effort-minimizing) goal	Low	Assortment selection	Satisfaction	6	24	−1.54	0.06	0.01
	4	40	Hotel resorts	44	Decision (effort-minimizing) goal	High	Product selection	Satisfaction	6	24	−0.66	0.05	0.01
Lin and Wu (2006), "The Effect of Variety on Consumer Preferences: The Role of Need for Cognition and Recommended Alternatives."	1	41	Chocolate	43	Decision (effort-minimizing) goal	Low	High need for cognition	Regret	6	16	−1.69	0.13	0.01
Shah and Wolford (2007), "Buying Behavior as a Function of Parametric Variation of Number of Choices."	1	42	Pens	80	No moderators	–	–	Choice deferral	6–12	14–20	0.77	0.05	0.01
	3	43	Coffee	20	Preference uncertainty	Low	Ideal point available	Satisfaction	5	50	−0.30	0.20	0.00

(continued on next page)

Table 1 (*continued*)

Author/article	Study	ID	Product category	Sample size	Moderators of choice overload (independent variables): Conceptual factor	Factor level	Condition	Indicators of choice overload (dependent variables)	Assortment size: Small	Large	Effect size: Cohen's *d*	S^2	Weight
Mogilner et al. (2008), "The Mere Categorization Effect: How the Presence of Categories Increases Choosers' Perceptions of Assortment Variety and Outcome Satisfaction."	3	44	Coffee	39	Preference uncertainty	High	Ideal point not available	Satisfaction	5	50	1.21	0.12	0.00
Chernev and Hamilton (2009), "Assortment Size and Option Attractiveness in Consumer Choice Among Retailers."	1	45	Sandwich shops	30	Choice set complexity	Low	Less attractive options	Assortment choice	9	38	−1.65	0.07	0.00
	1	46	Sandwich shops	30	Choice set complexity	High	More attractive options	Assortment choice	9	38	−0.40	0.07	0.00
	2	47	Assorted products	126	Choice set complexity	Low	Less attractive options	Assortment choice	8	24	−0.78	0.02	0.02
	2	48	Assorted products	118	Choice set complexity	High	More attractive options	Assortment choice	8	24	0.44	0.02	0.01
	3	49	Jam	69	Choice set complexity	Low	Less attractive options	Assortment choice	9	54	−1.58	0.03	0.01
	3	50	Jam	72	Choice set complexity	High	More attractive options	Assortment choice	9	54	0.00	0.03	0.01
	4	51	Assorted products	19	Choice set complexity	Low	Less attractive options	Assortment choice	9	54	−1.58	0.03	0.00
	4	52	Assorted products	23	Choice set complexity	High	More attractive options	Assortment choice	9	54	0.02	0.02	0.00
	5	53	Chocolate stores	47	Choice set complexity	Low	Less attractive options	Assortment choice	9	54	−1.02	0.04	0.01
	5	54	Chocolate stores	47	Choice set complexity	High	More attractive options	Assortment choice	9	54	−0.21	0.04	0.01
Fasolo et al. (2009), "The Effect of Choice Complexity on the Time Spent Choosing."	1	55	Mobile phones	64	No moderators	–	–	Satisfaction	6	24	0.06	0.06	0.01
	2	56	Mobile phones	60	No moderators	–	–	Satisfaction	6	24	0.52	0.07	0.01
	2	57	Mobile phones	60	No moderators	–	–	Satisfaction	6	24	0.11	0.07	0.01
Haynes (2009), "Testing the Boundaries of the Choice Overload Phenomenon: The Effect of Number of Options and Time Pressure on Decision Difficulty and Satisfaction."	1	58	Various prizes	36	Decision task difficulty	Low	Low time pressure	Satisfaction	3	10	0.28	0.11	0.00
	1	59	Various prizes	33	Decision task difficulty	High	High time pressure	Satisfaction	3	10	0.64	0.13	0.00
	1	60	Various prizes	36	Decision task difficulty	Low	Low time pressure	Regret	3	10	0.17	0.11	0.00
	1	61	Various prizes	33	Decision task difficulty	High	High time pressure	Regret	3	10	−0.04	0.12	0.00
Scheibehenne et al. (2009), "What Moderates the Too-Much-Choice Effect."	1	62	Restaurant coupons	80	No moderators	–	–	Choice deferral	5	30	−0.11	0.05	0.01
	2a	63	Charity	60	Preference uncertainty	Low	High expertise	Choice deferral	2	30	−0.32	0.07	0.01
	2a	64	Charity	57	Preference uncertainty	High	Low expertise	Choice deferral	5	40	−0.13	0.07	0.01
	2b	65	Charity	75	No moderators	–	–	Choice deferral	5	79	−0.18	0.05	0.01
	2c	66	Charity	80	Decision task difficulty	High	Justification required	Choice deferral	5	80	0.37	0.05	0.01
	3a	67	Music	80	Preference uncertainty	Low	High expertise	Satisfaction	6	30	−0.25	0.03	0.01
	3b	68	Music	87	Preference uncertainty	Low	High expertise	Satisfaction	6	30	−0.05	0.02	0.01
Sela et al. (2009), "Variety, Vice, and Virtue: How Assortment Size Influences Option Choice."	1a	69	Ice cream	121	No moderators	–	–	Option selection	2	10	0.38	0.03	0.02
	1b	70	Food	75	No moderators	–	–	Option selection	4	12	0.43	0.05	0.01
	2	71	Printers, MP3 players	50	No moderators	–	–	Option selection	4	12	0.89	0.08	0.01
	3	72	Printers, MP3 players	156	No moderators	–	–	Option selection	4	12	0.35	0.03	0.02

	4	73	Laptops	86	Choice set complexity	Low	Dominant (justifiable) option available	Option selection	4	12	−0.47	0.05	0.01
	4	74	Laptops	85	Choice set complexity	High	Dominant (justifiable) option not available	Option selection	4	12	0.45	0.05	0.01
	5	75	Printers, MP3 players	84	Choice set complexity	Low	Dominant (justifiable) option available	Option selection	4	12	−0.46	0.05	0.01
	5	76	Printers, MP3 players	84	Choice set complexity	High	Dominant (justifiable) option not available	Option selection	4	12	0.48	0.05	0.01
Diehl and Poynor (2010), "Great Expectations?! Assortment Size, Expectations and Satisfaction."	2	77	Camcorder	165	No moderators	–	–	Satisfaction	8	32	0.33	0.02	0.02
	3	78	Computer wallpaper	65	No moderators	–	–	Satisfaction	60	300	0.54	0.06	0.01
Greifeneder et al. (2010), "Less May Be More When Choosing Is Difficult: Choice Complexity and Too Much Choice."	1	79	Pens	40	Decision task difficulty	Low	Low number of attributes	Satisfaction	6	30	−0.12	0.10	0.01
	1	80	Pens	40	Decision task difficulty	High	High number of attributes	Satisfaction	6	30	0.81	0.11	0.01
	2	81	MP3 players	52	Decision task difficulty	Low	Low number of attributes	Satisfaction	6	30	−0.28	0.08	0.01
	2	82	MP3 players	52	Decision task difficulty	High	High number of attributes	Satisfaction	6	30	0.54	0.08	0.01
Inbar et al. (2011), "Decision Speed and Choice Regret: When Haste Feels Like Waste."	1	83	DVDs	27	No moderators	–	–	Regret	5	30	1.22	0.18	0.00
	2	84	DVDs	78	Decision task difficulty	Low	Low time pressure	Regret	15	45	−0.31	0.05	0.01
	2	85	DVDs	78	Decision task difficulty	High	High time pressure	Regret	15	45	0.68	0.05	0.01
Goodman and Malkoc (2012), "Choosing Here and Now Versus There and Later: The Moderating Role of Psychological Distance on Assortment Size Preferences."	1A	86	Restaurant coupons	63	Decision (effort-minimizing) goal	Low	Low level of construal	Assortment choice	7	14	−0.55	0.03	0.01
	1A	87	Restaurant coupons	67	Decision (effort-minimizing) goal	High	High level of construal	Assortment choice	7	14	0.15	0.03	0.01
	1B	88	Ice cream	78	Decision (effort-minimizing) goal	Low	Low level of construal	Assortment choice	6	18	−1.53	0.03	0.01
	1B	89	Ice cream	82	Decision (effort-minimizing) goal	High	High level of construal	Assortment choice	6	18	−0.80	0.02	0.01
	2	90	Vacation packages	51	Decision (effort-minimizing) goal	Low	Low level of construal	Assortment choice	6	18	−1.14	0.04	0.01
	2	91	Vacation packages	47	Decision (effort-minimizing) goal	High	High level of construal	Assortment choice	6	18	−0.30	0.04	0.01
	3	92	Blenders	42	Decision (effort-minimizing) goal	Low	Low level of construal	Assortment choice	6	18	−0.99	0.05	0.01
	3	93	Blenders	45	Decision (effort-minimizing) goal	High	High level of construal	Assortment choice	6	18	0.04	0.04	0.01
	4	94	Blenders	56	Decision (effort-minimizing) goal	Low	Low level of construal	Assortment choice	4	24	−1.49	0.04	0.01
	4	95	Blenders	41	Decision (effort-minimizing) goal	High	High level of construal	Assortment choice	4	24	−0.54	0.05	0.01
Morrin et al. (2012), "Plan Format and Participation in 401(k) Plans: The Moderating Role of Investor Knowledge."	1	96	Mutual funds	77	Preference uncertainty	Low	High expertise	Choice deferral	9	21	−0.56	0.05	0.01
	1	97	Mutual funds	73	Preference uncertainty	High	Low expertise	Choice deferral	9	21	0.33	0.05	0.01
Townsend and Kahn (2014), "The "Visual Preference Heuristic": The Influence of Visual versus Verbal Depiction on Assortment Processing, Perceived Variety, and Choice Overload."	5	98	Crackers	129	Decision task difficulty	Low	Verbal presentation format	Choice deferral	8	27	−0.32	0.03	0.02
	5	99	Crackers	107	Decision task difficulty	High	Visual presentation format	Choice deferral	8	27	0.37	0.04	0.01

Note.—*Study* indicates the number of the study in the corresponding paper. *ID* is the identification number assigned to each observation for the purposes of the meta-analysis. *Conceptual factors* are the four factors—decision task difficulty, choice set complexity, preference uncertainty, and decision (effort-minimizing) goal—depicted in Fig. 1, *operationalized* by a variety of study-specific variables. *Assortment size* refers to the number of options used to represent small and large assortments in each study. *Cohen's d* is the measure of the effect size, S^2 is the corresponding variance, and *weight* is the relative weight of each observation as a function of the sample size. Studies using multiple dependent variables are reported in the table multiple times; this replication is controlled for in the statistical analysis.

meta-regression model, in which the first two levels capture the specific effect sizes across studies and the third level captures the underlying articles. This approach enables us to account for the fact that some of the individual observations are part of the same experiments, a number of which belong to the same articles. Controlling for interdependencies across experiments is important because effect sizes reported in the same article are likely to be more similar compared to effect sizes in experiments reported in articles following different research paradigms. Thus, the three-level meta-regression approach allows us to reduce the risk of spurious findings that may result from treating effect sizes that are reported in the same article as independent sources of information. The resulting model is as follows:

$ES_{ia} = \beta_{0NM} + \beta_1$ SetComplexity + β_2 TaskDifficulty + β_3 PreferenceUncertainty + β_4 DecisionGoal + β_5 ChoiceDeferral + β_6 SwitchingLikelihood + β_7 OptionSelection + β_8 Assortment Choice + β_8 Satisfaction + β_{10} DecisionRegret $+\upsilon_{0a} + \eta_{ia}$

Here, the intercept β_{0NM} represents the overall effect of assortment size in the absence of moderators. The next four factors (β_1–β_4) capture the four hypothesized moderators of choice overload (choice set complexity, decision task difficulty, preference uncertainty, and decision goal). The following six factors (β_5–β_{10}) reflect the six outcome measures used in different experiments (satisfaction/confidence, choice deferral, switching likelihood, assortment choice, regret, and option selection).

The model further includes two random sources of variance that capture effects not explained by the four moderators. Thus, the between-study variability η_{ia} estimates random deviations from the intercept and moderator effects, whereby its size reflects the degree to which the intercept and moderators can capture any observed differences among the effect sizes. We also estimate the variance of υ_{0a}, which captures the fact that that some experiments stem from the same article and reflects the degree to which effect sizes in these experiments differ from one another.

Results

We present our findings starting with describing the fit of our model with the existing empirical data and its ability to account for the variance across existing studies. We then proceed to test the effects of the specific drivers of choice overload identified by our conceptual model. Finally, we test for the effects of additional factors that might influence choice overload, as well as for the presence of publication bias in the data.

Model fit

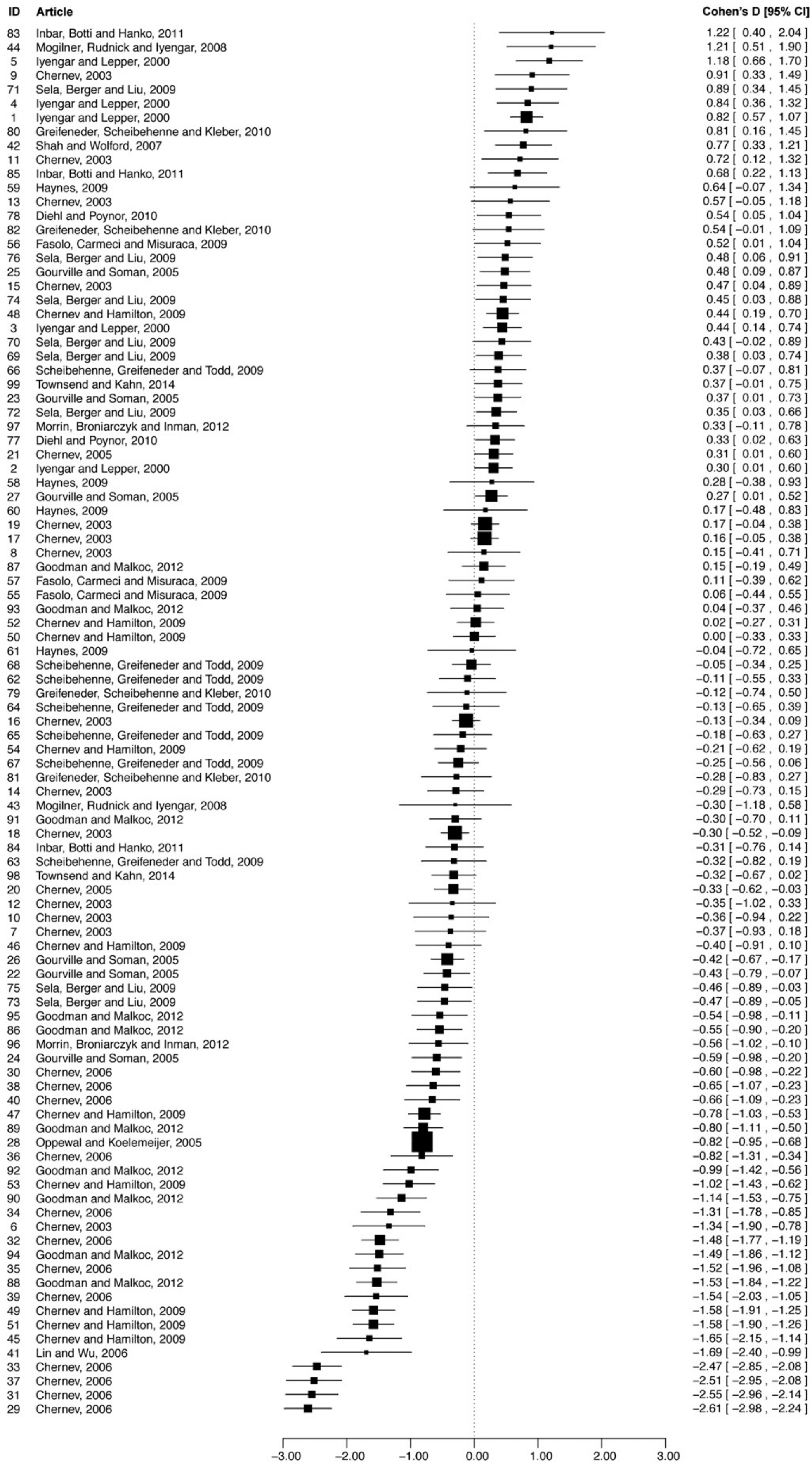
The data show that the moderators and outcome measures capture 68% of the residual variances estimated at the study and article levels (Huedo-Medina, Sanchez-Meca, Marin-Martinez, & Botella, 2006) compared to the intercept-only model. The fit difference between the model including the conceptual moderators and outcome measures outlined in the previous section and the intercept-only model is highly significant (χ^2 (10) = 118.1, p < .001), indicating that our conceptual framework receives support by accounting for a substantial variation in the effect sizes. We further estimate the residual variances as 0.05 at the study level and as 0.13 at the article level. Overall, these data suggest that the observed heterogeneity in the reported effect sizes of the studies are reasonably well accounted for by the moderators as derived by our theoretical framework.

To further test the validity of our conceptual model, we investigated whether the effects of the moderating factors interacted with any of the outcome measures. The interaction test showed that the effects of each moderator across the outcome measures did not vary significantly. The corresponding test statistics for the interaction effect of choice set complexity, decision task difficulty, preference uncertainty, and decision goal are χ^2 (2) = 3.6, p = .16, χ^2 (3) = .6, p = .90, χ^2 (3) = .5, p = .92, and χ^2 (2) = 4.3, p = .12, respectively. These results for each of the four factors are consistent with our conceptual model presented in Fig. 1, showing that different moderators yield similar effects across different outcome measures. Another test of the validity of our grouping of empirical factors into conceptual factors is the degree to which each of the conceptual factors captures the variability among the effect sizes across its different operationalizations. In this context, the fact that different operationalizations lead to similar effect sizes would be reflected in a nonsignificant interaction between the individual operationalizations of each conceptual factor and the impact of assortment size on choice overload. The test statistics for the grouping hypothesis of the four moderators are: χ^2 (3) = 3.7, p = .29 for choice set complexity; χ^2 (3) = 4.4, p = .23 for decision task difficulty; χ^2 (1) = 1.9, p = .17 for preference uncertainty; and χ^2 (2) = 6.8, p = .03 for decision goal. The absence of significant interactions for three of the four factors is consistent with the notion that these different operationalizations lead to similar effect sizes. For example, in the case of choice set complexity, this means that its different operationalizations—the availability of a dominant option, option attractiveness, option alignability, and option complementarity—have similar explanatory power. For the decision goal factor, we find that decision focus has greater impact on the overload effect compared to the other two factors (decision intent and level of construal). We also tested for multicollinearity by examining the correlation matrix of the independent variables and found no evidence for it; all of the correlations were small and most were nonsignificant.

Effects of the specific moderators of choice overload

To examine the effect of the four factors identified as the potential drivers of choice overload, we first examine a model that does not include these moderators and then compare this

Fig. 2. Forest plot of the overall effect of assortment size on choice overload in a model without conceptual moderators. *Note*.—The Forest plot depicts effect sizes and their respective confidence intervals for individual observations. The individual observations are arranged by effect size, starting with the strongest positive effect at the top and ending with the strongest negative effect on the bottom. The data show that the effect sizes vary from −4.9 to 1.6, suggesting significant variability in the experimental results. The large negative effect sizes in the four observations at the bottom of the chart are consistent with individuals' natural preference for large assortments in the context of the assortment choice task.


ID Article Cohen's D [95% CI]
83 Inbar, Botti and Hanko, 2011 1.22 [0.40 , 2.04]
44 Mogilner, Rudnick and Iyengar, 2008 1.21 [0.51 , 1.90]
5 Iyengar and Lepper, 2000 1.18 [0.66 , 1.70]
9 Chernev, 2003 0.91 [0.33 , 1.49]
71 Sela, Berger and Liu, 2009 0.89 [0.34 , 1.45]
4 Iyengar and Lepper, 2000 0.84 [0.36 , 1.32]
1 Iyengar and Lepper, 2000 0.82 [0.57 , 1.07]
80 Greifeneder, Scheibehenne and Kleber, 2010 0.81 [0.16 , 1.45]
42 Shah and Wolford, 2007 0.77 [0.33 , 1.21]
11 Chernev, 2003 0.72 [0.12 , 1.32]
85 Inbar, Botti and Hanko, 2011 0.68 [0.22 , 1.13]
59 Haynes, 2009 0.64 [−0.07 , 1.34]
13 Chernev, 2003 0.57 [−0.05 , 1.18]
78 Diehl and Poynor, 2010 0.54 [0.05 , 1.04]
82 Greifeneder, Scheibehenne and Kleber, 2010 0.54 [−0.01 , 1.09]
56 Fasolo, Carmeci and Misuraca, 2009 0.52 [0.01 , 1.04]
76 Sela, Berger and Liu, 2009 0.48 [0.06 , 0.91]
25 Gourville and Soman, 2005 0.48 [0.09 , 0.87]
15 Chernev, 2003 0.47 [0.04 , 0.89]
74 Sela, Berger and Liu, 2009 0.45 [0.03 , 0.88]
48 Chernev and Hamilton, 2009 0.44 [0.19 , 0.70]
3 Iyengar and Lepper, 2000 0.44 [0.14 , 0.74]
70 Sela, Berger and Liu, 2009 0.43 [−0.02 , 0.89]
69 Sela, Berger and Liu, 2009 0.38 [0.03 , 0.74]
66 Scheibehenne, Greifeneder and Todd, 2009 0.37 [−0.07 , 0.81]
99 Townsend and Kahn, 2014 0.37 [−0.01 , 0.75]
23 Gourville and Soman, 2005 0.37 [0.01 , 0.73]
72 Sela, Berger and Liu, 2009 0.35 [0.03 , 0.66]
97 Morrin, Broniarczyk and Inman, 2012 0.33 [−0.11 , 0.78]
77 Diehl and Poynor, 2010 0.33 [0.02 , 0.63]
21 Chernev, 2005 0.31 [0.01 , 0.60]
2 Iyengar and Lepper, 2000 0.30 [0.01 , 0.60]
58 Haynes, 2009 0.28 [−0.38 , 0.93]
27 Gourville and Soman, 2005 0.27 [0.01 , 0.52]
60 Haynes, 2009 0.17 [−0.48 , 0.83]
19 Chernev, 2003 0.17 [−0.04 , 0.38]
17 Chernev, 2003 0.16 [−0.05 , 0.38]
8 Chernev, 2003 0.15 [−0.41 , 0.71]
87 Goodman and Malkoc, 2012 0.15 [−0.19 , 0.49]
57 Fasolo, Carmeci and Misuraca, 2009 0.11 [−0.39 , 0.62]
55 Fasolo, Carmeci and Misuraca, 2009 0.06 [−0.44 , 0.55]
93 Goodman and Malkoc, 2012 0.04 [−0.37 , 0.46]
52 Chernev and Hamilton, 2009 0.02 [−0.27 , 0.31]
50 Chernev and Hamilton, 2009 0.00 [−0.33 , 0.33]
61 Haynes, 2009 −0.04 [−0.72 , 0.65]
68 Scheibehenne, Greifeneder and Todd, 2009 −0.05 [−0.34 , 0.25]
62 Scheibehenne, Greifeneder and Todd, 2009 −0.11 [−0.55 , 0.33]
79 Greifeneder, Scheibehenne and Kleber, 2010 −0.12 [−0.74 , 0.50]
64 Scheibehenne, Greifeneder and Todd, 2009 −0.13 [−0.65 , 0.39]
16 Chernev, 2003 −0.13 [−0.34 , 0.09]
65 Scheibehenne, Greifeneder and Todd, 2009 −0.18 [−0.63 , 0.27]
54 Chernev and Hamilton, 2009 −0.21 [−0.62 , 0.19]
67 Scheibehenne, Greifeneder and Todd, 2009 −0.25 [−0.56 , 0.06]
81 Greifeneder, Scheibehenne and Kleber, 2010 −0.28 [−0.83 , 0.27]
14 Chernev, 2003 −0.29 [−0.73 , 0.15]
43 Mogilner, Rudnick and Iyengar, 2008 −0.30 [−1.18 , 0.58]
91 Goodman and Malkoc, 2012 −0.30 [−0.70 , 0.11]
18 Chernev, 2003 −0.30 [−0.52 , −0.09]
84 Inbar, Botti and Hanko, 2011 −0.31 [−0.76 , 0.14]
63 Scheibehenne, Greifeneder and Todd, 2009 −0.32 [−0.82 , 0.19]
98 Townsend and Kahn, 2014 −0.32 [−0.67 , 0.02]
20 Chernev, 2005 −0.33 [−0.62 , −0.03]
12 Chernev, 2003 −0.35 [−1.02 , 0.33]
10 Chernev, 2003 −0.36 [−0.94 , 0.22]
7 Chernev, 2003 −0.37 [−0.93 , 0.18]
46 Chernev and Hamilton, 2009 −0.40 [−0.91 , 0.10]
26 Gourville and Soman, 2005 −0.42 [−0.67 , −0.17]
22 Gourville and Soman, 2005 −0.43 [−0.79 , −0.07]
75 Sela, Berger and Liu, 2009 −0.46 [−0.89 , −0.03]
73 Sela, Berger and Liu, 2009 −0.47 [−0.89 , −0.05]
95 Goodman and Malkoc, 2012 −0.54 [−0.98 , −0.11]
86 Goodman and Malkoc, 2012 −0.55 [−0.90 , −0.20]
96 Morrin, Broniarczyk and Inman, 2012 −0.56 [−1.02 , −0.10]
24 Gourville and Soman, 2005 −0.59 [−0.98 , −0.20]
30 Chernev, 2006 −0.60 [−0.98 , −0.22]
38 Chernev, 2006 −0.65 [−1.07 , −0.23]
40 Chernev, 2006 −0.66 [−1.09 , −0.23]
47 Chernev and Hamilton, 2009 −0.78 [−1.03 , −0.53]
89 Goodman and Malkoc, 2012 −0.80 [−1.11 , −0.50]
28 Oppewal and Koelemeijer, 2005 −0.82 [−0.95 , −0.68]
36 Chernev, 2006 −0.82 [−1.31 , −0.34]
92 Goodman and Malkoc, 2012 −0.99 [−1.42 , −0.56]
53 Chernev and Hamilton, 2009 −1.02 [−1.43 , −0.62]
90 Goodman and Malkoc, 2012 −1.14 [−1.53 , −0.75]
34 Chernev, 2006 −1.31 [−1.78 , −0.85]
6 Chernev, 2003 −1.34 [−1.90 , −0.78]
32 Chernev, 2006 −1.48 [−1.77 , −1.19]
94 Goodman and Malkoc, 2012 −1.49 [−1.86 , −1.12]
35 Chernev, 2006 −1.52 [−1.96 , −1.08]
88 Goodman and Malkoc, 2012 −1.53 [−1.84 , −1.22]
39 Chernev, 2006 −1.54 [−2.03 , −1.05]
49 Chernev and Hamilton, 2009 −1.58 [−1.91 , −1.25]
51 Chernev and Hamilton, 2009 −1.58 [−1.90 , −1.26]
45 Chernev and Hamilton, 2009 −1.65 [−2.15 , −1.14]
41 Lin and Wu, 2006 −1.69 [−2.40 , −0.99]
33 Chernev, 2006 −2.47 [−2.85 , −2.08]
37 Chernev, 2006 −2.51 [−2.95 , −2.08]
31 Chernev, 2006 −2.55 [−2.96 , −2.14]
29 Chernev, 2006 −2.61 [−2.98 , −2.24]
−3.00 −2.00 −1.00 0.00 1.00 2.00 3.00

model with one that includes the four moderators implied by our conceptual model—an approach consistent with prior meta-analytic research (Scheibehenne et al., 2010). Specifically, the simple model involves the intercept β_0 and the two random sources of variance described earlier—υ_{0a} and η_{ia}—as shown below.

$$ES_{ia} = \beta_0 + \upsilon_{0a} + \eta_{ia}$$

The overall effect of assortment size for each observation can be visually represented using a Forest plot that depicts effect sizes (Cohen's *d*) and their respective confidence intervals for each specific observation (Fig. 2). The data show that in the absence of the conceptual moderators, the mean effect of assortment size on choice overload is nonsignificant ($t(20) = -.10$; $p = .48$)—a finding consistent with the findings reported by prior research (Scheibehenne et al., 2010). At the same time, there was a significant unexplained variability of the effect size across individual articles and studies not accounted for by the simple model, suggesting that the simple model is not representative of the data (χ^2 (78) = 665.5, $p < .001$ at the study level and χ^2 (20) = 130.3, $p < .001$ at the article level).

Given the significant amount of unexplained variance by the simple model, we then proceed with testing a more comprehensive model that includes the four conceptual moderators stemming from our theorizing. The results of the statistical analysis are summarized in Table 2, which reports that all four factors—choice set complexity, decision task difficulty, preference uncertainty, and decision goal—identified by our conceptual model as potential antecedents of choice overload are statistically significant ($p < .001$) and have relatively strong effects on choice overload. This finding lends support to our conceptual model depicted in Fig. 1, showing that each of these four factors has a significant impact on choice overload, whereby higher levels of decision task difficulty, greater choice set complexity, higher preference uncertainty, and a more prominent effort-minimizing goal lead to a greater choice overload.

With respect to the dependent variables used to capture choice overload, we find that the effect estimates of four of the six outcome measures reflecting overload effects above and beyond the moderator effects are nonsignificant. Thus, because satisfaction/confidence, regret, choice deferral, and switching likelihood do not produce an effect that is not already captured by the four moderating variables, we conclude that they are equally powerful in capturing the impact of assortment size on choice overload. The two outcome measures producing a significant effect are assortment choice and option selection, and we conjecture that their ability to capture unique aspects of the impact of assortment size on choice overload is a function of the specifics of the decision task associated with these outcome measures. Specifically, the assortment-choice task typically involves a very strong preference for large assortments, which is likely to skew individuals' choices in favor of the larger assortment (Chernev, 2006). The option-selection task, on the other hand, employed assortments that were on average significantly smaller than those used with the other

Table 2
A summary of the meta-analysis results.

Effect	Estimate	SE	T	P
Intercept (no moderators)	.41	.14	3.0	.01
Moderators of choice overload				
Choice set complexity	.55	.07	7.9	<.001
Decision task difficulty	.37	.08	4.7	<.001
Preference uncertainty	.32	.07	4.5	<.001
Decision goal	.56	.06	8.8	<.001
Measures of choice overload				
Satisfaction	.12	.12	1.1	.29
Regret	−.17	.25	−.69	.49
Choice deferral	−.08	.15	−.50	.62
Switching likelihood	.23	.22	1.1	.28
Assortment choice	−.72	.16	−4.4	.001
Option selection	−.45	.21	−2.10	.04

Note.—Individual cells represent the estimates of the meta-regression model. The data further show that for the model that includes the conceptual moderators the intercept term reflecting the main effect of assortment size is significant ($t(67) = 3.0$; $p = .004$), indicating that studies that do not include moderators tend to exhibit a systematic overload effect. All four moderators identified by our conceptual model (Fig. 1) are significant and the corresponding coefficients indicate comparable effects, with the decision goal and choice set complexity having the strongest effects and preference uncertainty the weakest effect on choice overload. Thus, higher levels of decision task difficulty, greater choice set complexity, higher preference uncertainty, and a more prominent, effort-minimizing goal tend to produce greater choice overload. The last six rows indicate the differential impact of the individual response variables. The data show that four of the six factors—satisfaction/confidence, regret, choice deferral, and switching likelihood—do not have a significant impact, suggesting that they capture the impact of assortment size on choice overload equally well.

dependent variables (the mean assortment sizes in the option-choice task were 4 and 12, significantly smaller than the corresponding assortment sizes of 8 and 34 in the other decision tasks). The fact that the remaining four dependent variables—satisfaction/confidence, regret, choice deferral, and switching likelihood—do not produce a significant effect above and beyond the four conceptual moderators, is important because it suggests that these measures could be used interchangeably to capture the impact of assortment size on choice overload.

The effect sizes and the respective confidence intervals for the specific observations can be visually represented using Forest plots, as shown in Fig. 3. Given our focus on identifying the differential impact of the four moderating factors, we organized the Forest plot by effect size within each moderator. The data represented by the Forest plots show that varying each of the four factors influences the direction of choice overload, such that the effect is positive in conditions where these factors are present and negative in conditions where these factors are less pronounced or absent.

The mean effect of assortment size on choice overload

Following the examination of the individual effects of the four moderators included in our conceptual model, we examine the mean overload effect in studies that do not include moderators (identified in Table 1). The data show that for studies that do not include moderators, the intercept term reflecting the main effect of assortment size is significant (t(67) = 3.0; p = .004), indicating that studies that do not include moderators tend to exhibit a systematic overload effect (Fig. 3E).

In addition to examining the mean overload effect in studies without moderators, we also examine the mean effect of choice overload across studies both with and without moderators. In this analysis, we exclude studies in which the decision goal involved choice among assortments. Indeed, whereas studies examining assortment choice are relevant for capturing the effect of the conceptual moderators (e.g., decision goal) on the impact of assortment size on choice overload, decisions that involve choices among assortments (rather than choices of an option from a given assortment) tend to display an inherent strong preference for larger assortments (Chernev, 2006). Accordingly, to examine the mean effect of choice overload we excluded observations that involved assortment choice (29–40, 45–54, and 86–95). The data show that across all studies

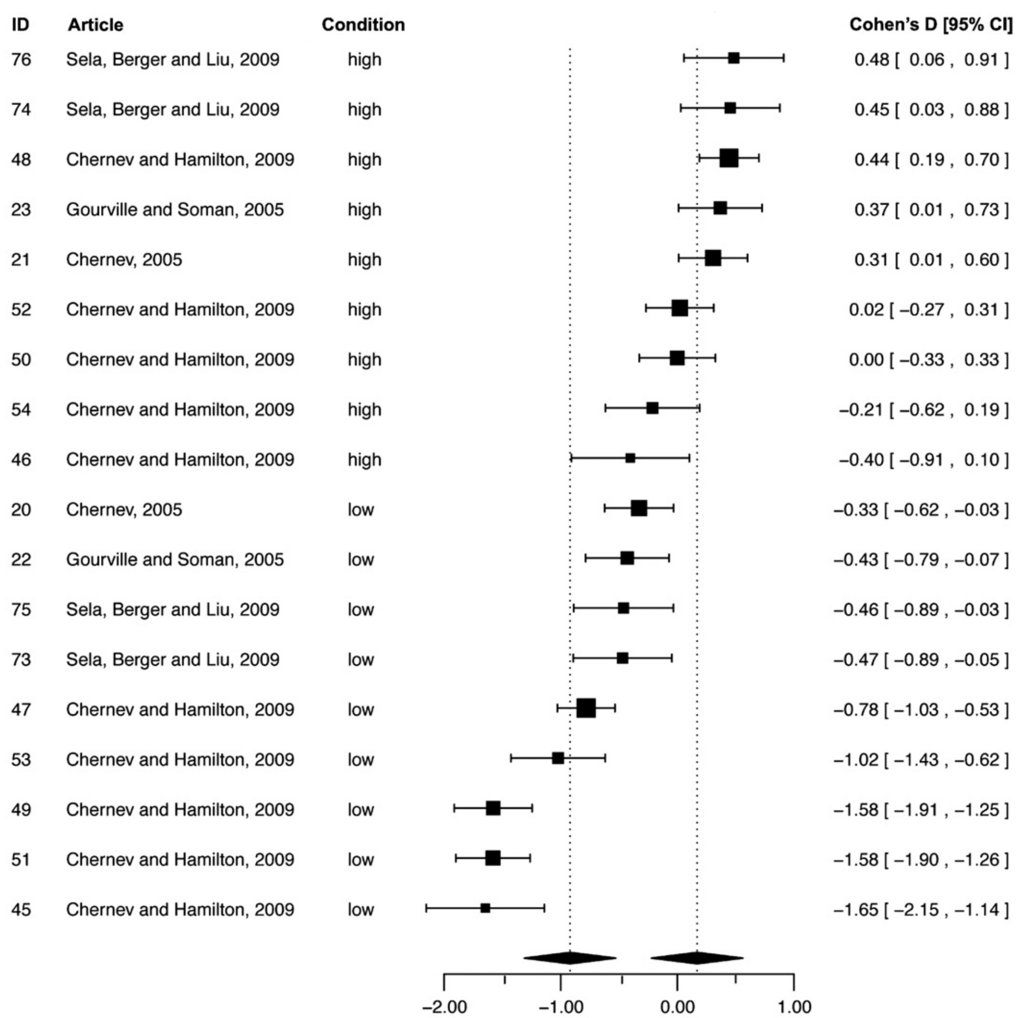


Fig. 3a. Forest plot showing how choice set complexity influences the impact of assortment size on choice overload. *Note.*—The Forest plots 3A–3E depict effect sizes and their respective confidence intervals for individual observations for each of the four moderating factors identified in Fig. 1, as well as for observations from studies without moderators. Here, the individual observations are grouped into one of the four moderating factors, with the individual observations within each factor, as well as the observations without moderators, arranged by effect size. Varying each factor influenced the direction of the effect of assortment size, such that choice overload is present in conditions where these factors are present/more pronounced and is in the opposite direction when these factors are less pronounced/absent. Within each of the plots depicting moderators (3A–3D), the level of each factor (high vs. low) is correlated with the direction of the effect, such that high levels are associated with choice overload whereas lower levels are associated with the opposite (more is better) effect. The mean values of the effect size for each of the two levels of a particular moderator are indicated with a diamond, whereby the size of the diamond reflects the uncertainty associated with estimating these effects. The overall effect (across the two conditions of each moderator) of assortment size in these plots is given by the difference between the dashed vertical lines. Studies without moderators (plot 3E) show the tendency of larger assortments to produce choice overload. Studies examining choice among assortments (Chernev & Hamilton, 2009 in plot 3A and Chernev, 2006 in plot 3D) display a less pronounced ability to engender choice overload—a finding that likely stems from the lower decision costs associated with choice among assortments.

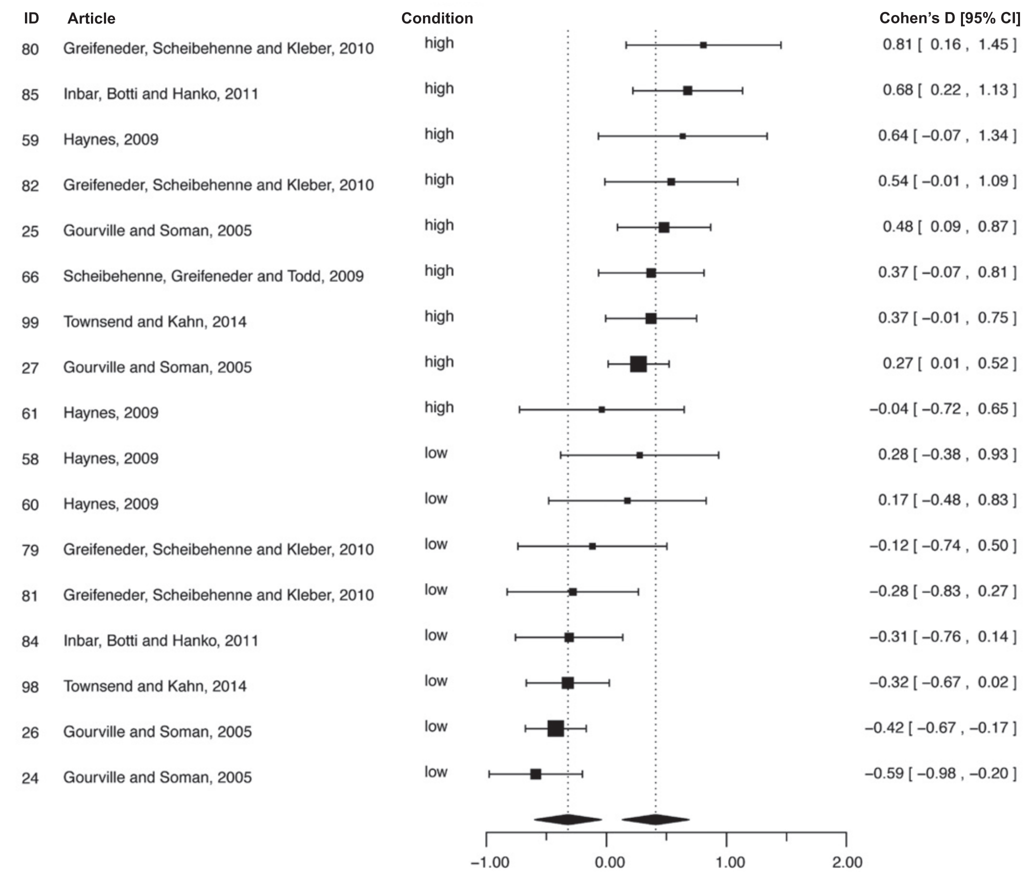


Fig. 3b. Forest plot showing how decision task difficulty influences the impact of assortment size on choice overload. (*continued*).

that examine choices from an already given assortment, assortment size has a significant impact on choice overload, such that in comparison to smaller assortments larger assortments are more likely to produce choice overload ($b = .17$, $t(39) = 4.5$, $p < .001$). We also tested the mean effect of assortment size on choice overload by isolating the effects of studies with and without moderators (using a model with separate intercepts for the studies with and without moderators rather than using a single intercept). This test yielded a non-significant effect for studies with moderators ($b = .04$, $t(39) = .9$, $p = .39$) and a significant effect for studies without moderators ($b = .41$, $t(39) = 5.3$, $p < .001$)—a finding suggesting that aggregating the observations across different levels of a given moderating factor is likely to attenuate (or eliminate) the choice overload effect (Chernev, Böckenholt, & Goodman, 2010).

The finding that assortment size can have a significant main effect on choice overload is counter to the data reported by prior meta-analytic research, which finds this effect to be nonsignificant (Scheibehenne et al., 2010). This discrepancy suggests that the mean effect of assortment size on choice overload is likely to be contingent on the subset of studies included in the meta-analysis and/or the conceptual model tested (Chernev et al., 2010). We address this discrepancy in more detail in the discussion section of this research.

The effect of assortment size across individual experiments

Most studies investigating the impact of assortment size on choice overload have treated assortment size as a binary variable, differentiating between small and large assortments. However, the operationalization of small versus large assortments has varied across these studies, enabling us to examine whether choice overload is indeed more pronounced in studies that utilize relatively larger assortments. Analysis of the choice set sizes of small and large assortments across the individual studies shows that the most common comparison involved 6 options, representing a small assortment, and 24 options, representing a large assortment (6 and 24 are the median values; the corresponding means are $M_{Small} = 5.4$, $SD = 18.6$ and $M_{Large} = 27.8$, $SD = 3.7$). This assortment size selection

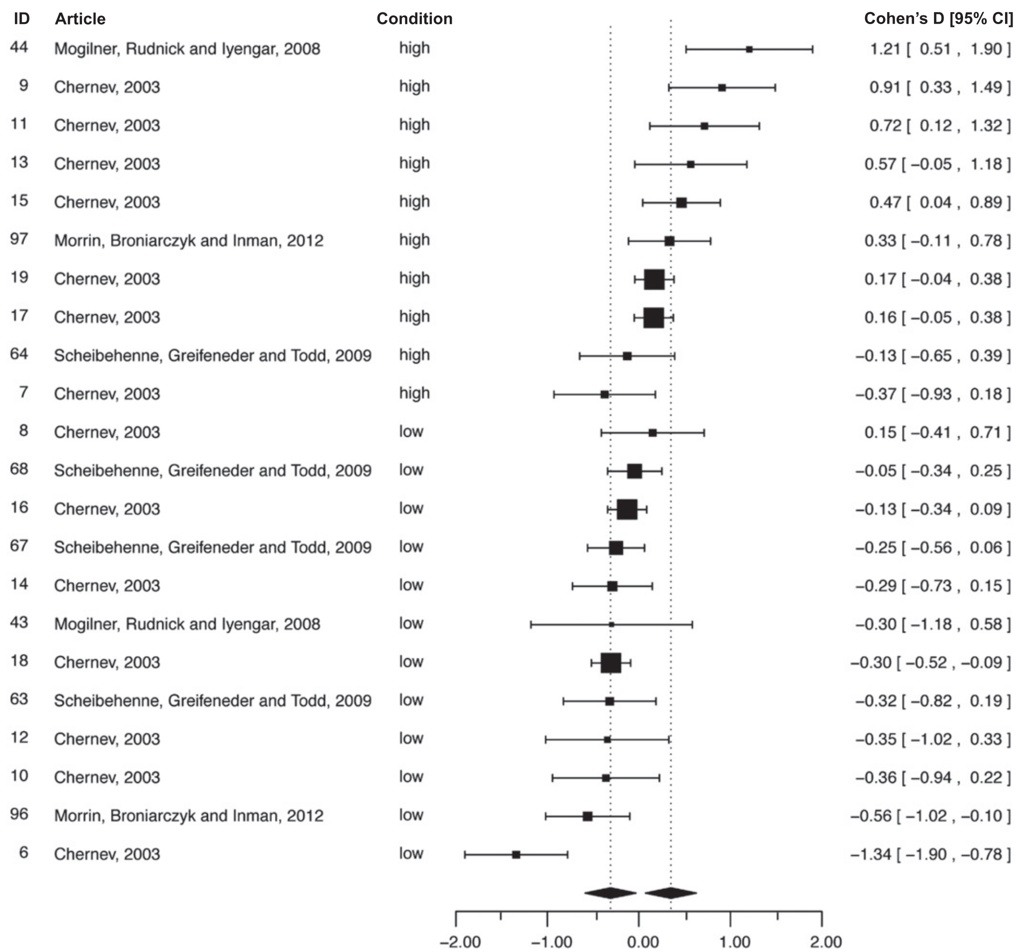


Fig. 3c. Forest plot showing how preference uncertainty influences the impact of assortment size on choice overload. (*continued*).

was likely influenced by the methodology used for the choice set sizes in the pioneering article reporting empirical evidence of choice overload (Iyengar & Lepper, 2000). The study-specific assortment sizes are given in Table 1 and the distribution of the sizes of small and large assortments across individual experiments is shown in Fig. 4.

To examine the effect of assortment size across studies, we added assortment size to our model as a variable. For the purposes of this analysis we excluded one observation (78) as an outlier because it used choice sets that were disproportionately larger than those used in the other studies. The data show that the effect of the larger assortment size across studies was not significant ($b = -.005$, $t(37) = -1.5$, $p = .13$). We also examined whether the effect of assortment size was likely to decline as the number of options in the choice set increased (Chernev & Hamilton, 2009; Ratner et al., 1999) by testing for a quadratic trend. However, the data showed no evidence that this effect diminishes as the size of the larger assortment increases ($b = .002$, $t(36) = 1.4$, $p = .17$).

The lack of a significant monotonically increasing relationship between assortment size and choice overload is consistent with the findings reported by prior research (Scheibehenne et al., 2010). This finding is further consistent with the argument made by Chernev et al. (2010), who reason that although conceptually such a relationship should exist, the failure of a meta-analysis to document it is not surprising, since there are a number of intervening factors (e.g., decision-maker's expertise, the composition and the organization of the assortment, and the nature of the decision task) that ultimately determine whether increasing assortment size will result in choice overload. Because the experiments included in the meta-analysis vary on a number of dimensions (e.g., option complexity, organization of the choice set, and product familiarity) that likely contribute to choice overload, the absence of a monotonic (linear or curvilinear) effect of assortment size is not inconsistent with the choice overload hypothesis. This line of reasoning is consistent with the distribution of small and large assortment sizes across individual experiments illustrated in Fig. 4. Thus, some studies demonstrate choice overload in choice sets with relatively few options (Chernev, 2005; Gourville & Soman, 2005; Haynes, 2009) whereas other studies show that overload is unlikely to be prominent even in relatively large choice sets (Chernev, 2006;

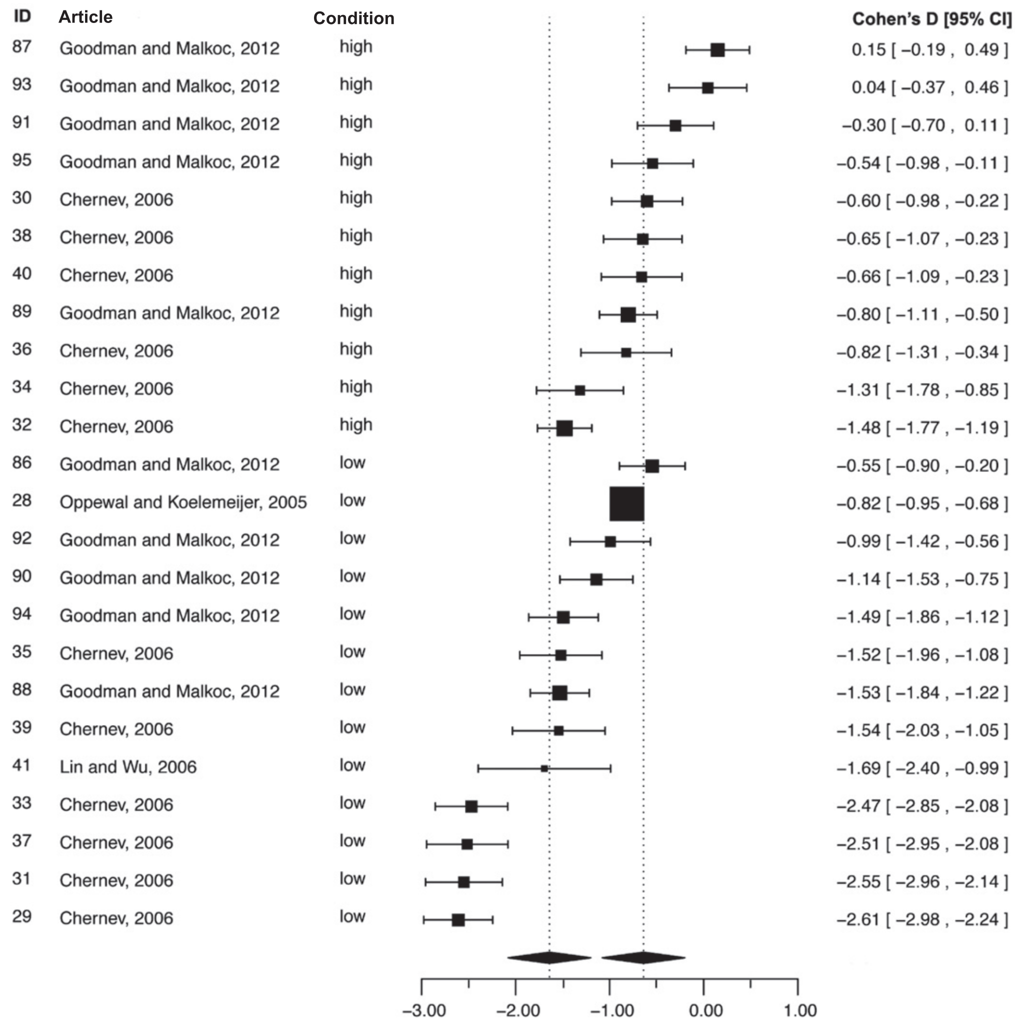


Fig. 3d. Forest plot showing how decision goal influences the impact of assortment size on choice overload. (*continued*).

Diehl & Poynor, 2010). The overlap between the two distributions suggests that some assortment sizes have been used across studies as both large and small assortments—a finding consistent with the existence of significant moderators that influence the impact of assortment size on choice overload.

Publication bias

An important consideration when conducting meta-analytical studies is to control for the tendency of authors and journals to overemphasize significant findings and underreport nonsignificant or inconclusive findings. This publication bias is likely to lead to asymmetric relationships between the effect sizes and their standard errors in the absence of moderators (Sterne & Egger, 2001). Such asymmetric relationships can be diagnosed with a funnel plot, which offers a visual tool for identifying publication bias in studies (Rothstein, Sutton, & Borenstein, 2005; Sterne, Becker, and Egger, 2005).

In the absence of moderators, the funnel plot typically displays effect sizes and their standard errors. However, when the tested model includes moderators, effect sizes are heterogeneous. Thus, it is more informative to examine the relationship between residual effect sizes and their standard errors after the effect of the moderators has been accounted for rather than between the effect sizes and their standard errors as they appear in the model that includes moderators. In addition to being directly comparable, the residual effect sizes provide information about the meta-regression's ability to account for the observed effect-size differences (Sutton et al., 2011).

To test for the existence of publication bias in the data, we examined the dispersion of the residual effects as a function of the size of the studies' standard errors. In general, the absence of publication bias is indicated by the fact that residual estimates with larger standard errors (located at the bottom of the funnel plot) are more widely dispersed than estimates with smaller standard errors (located at the top). These dispersions are expected to be symmetric and scattered around both sides

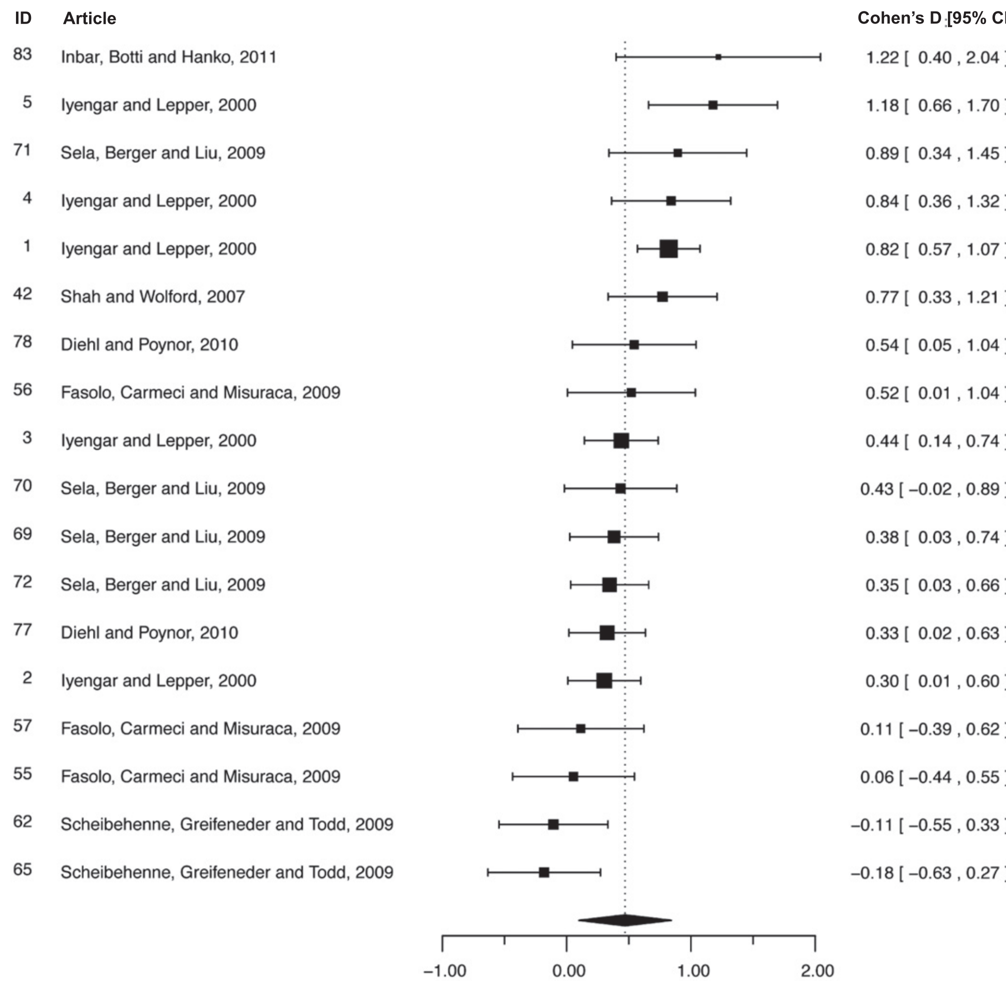


Fig. 3e. Forest plot showing the main effect (no moderators) of assortment size on choice overload. (*continued*).

of zero, with the size of the scatter increasing with less precision in the estimates. Deviations from a symmetric scatter of the residual effects and the studies' standard errors suggest publication bias because one would expect the residual effects to be randomly distributed in the absence of publication bias.

The funnel plot of the studies included in the meta-analysis is presented in Fig. 5. The pattern of dispersion of the residual effects in the considered studies shows little evidence for publication bias since the funnel plot appears to be symmetric and a regression test for funnel plot asymmetry yielded nonsignificant results. Specifically, we used a weighted regression model with a multiplicative dispersion term and the studies' standard errors as predictor. The results show that the residual effect size estimates cannot be predicted by the standard errors ($z = .34$, $p = .74$). This finding is consistent with the visual inspection of the funnel plot, suggesting a lack of systematic relationship between the standard errors of the effect sizes and their residual estimates. Thus, one can reasonably expect that the results of the meta-analysis are unlikely to be systematically influenced by publication bias.

Discussion

Key findings

Despite the plethora of prior studies examining whether and when large assortments are likely to lead to choice overload, there have been few attempts to develop an integrative, overarching model that characterizes the impact of assortment size on choice overload. In this context, our research contributes to the literature by identifying the conceptual drivers of the impact of assortment size on choice overload. To the best of our knowledge, this is the first attempt to identify the key conceptual drivers of choice overload, empirically test their validity, and quantify their relative effects.

Specifically, in this research we identify four key factors that can reliably predict whether, when, and how assortment size is

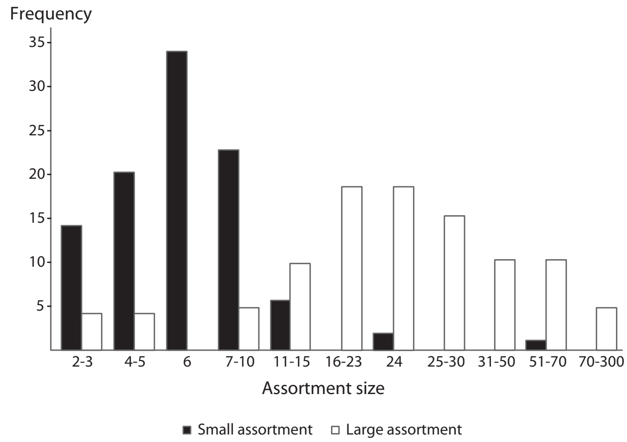


Fig. 4. Distribution of the sizes of small and large assortments across individual experiments. *Note*.—Black bars indicate assortment sizes representing smaller assortments and white bars indicate assortment sizes representing larger assortments. The overlap between the two distributions suggests that some assortment sizes have been used as both large and small assortments (in different experiments)—a finding consistent with the existence of significant moderators that influence the impact of assortment size on choice overload.

likely to influence choice overload: (1) the difficulty of the decision task, which reflects the structural properties of the decision task operationalized in terms of time constraints, decision accountability, number of attributes describing each option, and the complexity of the presentation format; (2) the complexity of the choice set, which reflects the value-based relationships among the choice alternatives, including the presence of a dominant option, as well as the overall attractiveness, alignability, and complementarity of the choice options; (3) consumers' preference uncertainty, which reflects the degree to which consumers can evaluate the benefits of the choice options and have an articulated ideal point; and (4) consumers' decision goal, which reflects the degree to which individuals aim to minimize the cognitive effort involved in making a choice among the options contained in the available assortments. More important, we show that each of these four factors has a directionally consistent and significant impact on choice overload, such that higher levels of decision task difficulty, greater choice set complexity, higher preference uncertainty, and a more prominent, effort-minimizing goal facilitate choice overload.

In addition to identifying the key factors that moderate the impact of assortment size on choice overload, we identify several common outcomes of choice overload used as dependent measures in prior research—satisfaction/confidence, regret, choice deferral, switching likelihood, assortment choice, and option selection—and examine the ability of these measures to capture unique aspects of the impact of assortment size on choice overload. In this context, we find that four of the six dependent measures—satisfaction/confidence, choice deferral, switching likelihood, and regret—are not significantly different from one another, suggesting that these four measures capture the impact of assortment size in a similar way and hence can be used interchangeably. To the best of our knowledge, this is the first systematic attempt to compare the degree to which different measures are able to capture the impact of assortment size on choice overload. Documenting the convergence of different operationalizations not only validates choice overload as a construct but also defines a set of equivalent operationalizations that could be used interchangeably in future research.

Our analysis further documents the presence of a significant main effect of assortment size on choice overload across studies that test the main effect of choice overload without explicitly controlling for moderating effects. Although not central to our analysis, this finding is notable because it is counter to the findings reported by prior research advocating the absence of such an effect (discussed in more detail in the following section). This discrepancy lends support to the notion that the main effect of assortment size is vulnerable to a variety of context effects and therefore is not a reliable measure of choice overload (Chernev et al., 2010).

Prior meta-analytic research

A prior meta-analytic review found little evidence of choice overload, concluding that the mean effect of assortment size on choice overload is nonsignificant (Scheibehenne et al., 2010). This analysis further questioned the existence of factors that can systematically lead to choice overload, arguing that no sufficient conditions could be identified that would lead to a reliable occurrence of choice overload. The discrepancy between the findings reported by prior research and the findings of our meta-analysis raises the question of identifying the key factors contributing to such disparate findings. We believe that this discrepancy can be attributed to two key factors: differences in the underlying data and differences in the model used to analyze the data. We address these two factors in more detail below.

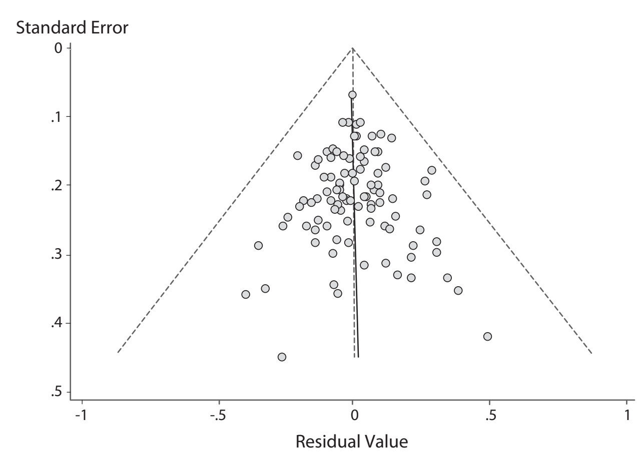


Fig. 5. Funnel plot of publication bias. *Note*.—The funnel plot with pseudo 95% confidence limits is approximately symmetrical, indicating that the effect sizes do not appear to exhibit a systematic pattern. The slightly slanted solid line represents the regression test for funnel-plot asymmetry proposed by Egger et al. (1997). The symmetric distribution of the effect sizes suggests the absence of a significant publication bias in the analyzed studies.

In their meta-analysis, Scheibehenne et al. (2010) report 63 observations from 50 published and unpublished experiments ($N = 5036$) conducted in the fields of psychology and marketing. The data used in our meta-analysis are different in several respects. First, our dataset is significantly larger, including 99 observations from 53 published studies ($N = 7202$). Second, to ensure consistent standards of experimentation, we focused only on peer-reviewed papers published in academic journals. Overall, our dataset included 78% of the Scheibehenne et al. (2010) observations reported in published articles.

The model used by Scheibehenne et al. (2010) differed from our model in several respects. First, these varied in the selection of potential moderators of the impact of assortment choice: Our model focused on four key conceptually derived factors, whereas the model used by Scheibehenne et al. (2010) included a mix of conceptual and descriptive moderators (i.e., whether the study controlled for respondents' expertise or prior preferences, whether the study was published or unpublished, publication year, whether the study included a hypothetical or a real choice, whether the study used satisfaction as a dependent variable, whether the study used consumption quantity as a dependent variable, the size of the large assortment, and whether the study was conducted in or outside of the United States). Second, our model distinguished among a variety of different outcome measures used by the individual studies, which enabled testing for their moderator-specific effects. Finally, we used a three-stage hierarchical model that controls for the fact that some of the observations are derived from the same article and, therefore, are not independent. Accordingly, our model accounts for 68% of the residual variances in the underlying studies—a substantial improvement over that of the model reported in Scheibehenne et al. (2010), which explains only 36% of the variance in the underlying data.[4]

To examine whether the discrepancy between our findings and those reported by prior research can be attributed to the differences in the data or the differences in the method, we reanalyzed the studies used Scheibehenne et al. (2010) with our conceptual model. The analysis produced results (reported in the Appendix B) consistent with those reported in Table 2 earlier in this paper. The fact that we validated our model in the context of the studies used by prior research suggests that the differences in the findings reported by the two meta-analyses cannot be attributed only to the differences in the underlying studies, but that they also stem from differences in conceptualizing the effects of assortment size on choice overload.

[4] The 56% estimate reported by Scheibehenne et al. (2010) is calculated as $\frac{\text{Variance}_{\text{ReducedModel}} - \text{Variance}_{\text{FullModel}}}{\text{Variance}_{\text{FullModel}}}$, which is an unconventional measure that we believe does not accurately report the amount of explained variance and can lead to outcomes whereby the amount of explained variance exceeds 100%. The conventional and more meaningful measure $\frac{\text{Variance}_{\text{ReducedModel}} - \text{Variance}_{\text{FullModel}}}{\text{Variance}_{\text{ReducedModel}}}$ suggests that the 2010 analysis accounts for only 36% of the variance in the data.

Future research

Despite its conceptual contributions, our research is only a first step toward developing a comprehensive understanding of how assortment size influences consumer choice and identifying conditions in which larger assortments produce choice overload. Indeed, the ability of meta-analytic research to uncover novel factors and quantify their effect is bound by the underlying empirical research. Therefore, further research might identify factors in addition to the four outlined in our study that are likely to influence choice overload. In this context, our analysis helps pinpoint the areas that would benefit from further investigation.

One particular area in need of further investigation is the impact of the decision maker's goals on choice overload. Indeed, compared to the other moderators of choice overload that have been investigated in multiple experiments, we were able to identify only a handful of studies explicitly examining how consumer goals influence choice overload. Accordingly, further research might seek to identify whether and how other goal-related factors such as decision accuracy, effort minimization, and purchase quantity influence consumer decision processes (Kahn et al., 2014).

A related overlooked area is how consumers' affective states influence the impact of assortment size on choice. Specifically, future research might examine the effect of positive versus negative emotions on the likelihood that consumers will experience choice overload. Our meta-analysis is consistent with the notion that the effect of assortment size on choice overload is likely to be a function of the affective state of the decision maker. Indeed, our data show that regret, as an operationalization of individuals' decision goal, was a particularly strong driver of choice overload—a finding consistent with the fundamental role of regret in self-regulation (Gilovich & Medvec, 1995; Simonson, 1992). In this context, future research might examine whether other affective states are likely to amplify or attenuate the impact of assortment size on choice overload. Furthermore, in addition to studying emotions as antecedents of choice overload, future research might examine emotions as a consequence of choice overload, focusing on the different types of affective outcomes associated with choosing from large assortments (Inbar et al., 2011).

It is also notable that studies measuring choice among assortments, while very similar in terms of their ability to capture the effects of the four moderators, stand out in terms of their main effect. Thus, the observations obtained from the three papers using assortment choice as a dependent variable (Chernev, 2006; Chernev & Hamilton, 2009; Goodman & Malkoc, 2012) indicate a much weaker choice overload effect, often displaying the opposite (more is better) effect. This result likely stems from the fact that when choosing among assortments, consumers express their expectations of choice overload rather than the actual overload. This finding suggests that when choosing among assortments, consumers are likely to underestimate the choice overload they will experience when making their final choice from the assortment selected. In this context, investigating consumer accuracy in anticipating and measuring choice overload is an important area for further research.

Further research might also investigate the relationship between the individual factors influencing choice overload. Our analysis examines the impact of choice set complexity, decision task difficulty, preference uncertainty, and decision goal in isolation from one another. This is because a very small fraction of the extant research has explicitly examined the simultaneous impact of multiple moderating factors on choice overload. Therefore, future empirical research is needed to examine the way in which the four factors identified by our research interact with one another—an approach that involves using more complex (e.g., three-factor) experimental designs.

The analyses of new empirical data collected to address these issues will benefit from an overarching framework that provides a basis for comparing the data reported by the individual studies. Our model provides such a framework to guide future research on choice overload. The data compiled by future research will, in turn, serve as the basis for further theory-guided analysis to enhance our understanding of the decision processes that determine when and how assortment size leads to choice overload.

Appendix A. Overview of the analyzed studies

The meta-analysis is based on 99 observations, 81 of which capture the four experimental factors: choice set complexity, decision task difficulty, preference uncertainty, and decision goal.[5] Specifically, the impact of *choice set complexity* is captured by 18 observations derived from nine studies reported in four different articles by Chernev (2005); Gourville and Soman (2005); Chernev and Hamilton (2009), and Sela et al. (2009). The impact of *decision task difficulty* is captured in 17 observations from eight studies reported in six articles by Gourville and Soman (2005); Haynes (2009); Scheibehenne et al. (2009); Greifeneder et al. (2010); Inbar et al. (2011), and Townsend and Kahn (2014). The impact of *preference uncertainty* is captured in 22 observations from ten studies reported in five articles by Chernev (2003a, 2003b); Mogilner et al. (2008); Scheibehenne et al. (2009), and Morrin et al. (2012). Finally, the impact of the *decision goal* is captured in 24 observations from eleven studies reported in four articles by Oppewal and Koelemeijer (2005); Chernev (2006); Lin and Wu (2006); Goodman and Malkoc (2012).

In addition to studies explicitly measuring the effect of the four factors identified in our model, there are several studies examining choice overload that did not include moderating factors. Some of these studies aim simply to document the choice overload phenomenon (Diehl & Poynor, 2010; Fasolo, Carmeci, & Misuraca, 2009; Iyengar & Lepper, 2000; Shah & Wolford, 2007), whereas others function as control conditions in articles that contain other moderators (Inbar et al., 2011; Scheibehenne et al., 2009; Sela et al., 2009). Collectively, these data are represented in 18 observations from 15 studies reported in seven articles.

[5] Note that some studies/articles test multiple experimental factors and, as a result, the sum of articles across factors is larger than the total number of articles.

Below, we offer a list of articles included in the meta-analysis, outlining the studies and observations included from each article.

1. Research by Iyengar and Lepper (2000) examines the impact of assortment size on choice overload. It consists of three studies without moderators, each involving two conditions (study 3 has an additional no choice condition; for the meta-analysis, we consider only the small and large assortment conditions). In all studies, the main dependent variable is choice deferral, but the second and third studies additionally report satisfaction. Therefore, this paper is responsible for five total observations (coded as 1–5; one from study 1 and two each from studies 2 and 3).
2. Research by Chernev (2003a) examines how the existence of an ideal point moderates the impact of assortment size on choice overload. In our meta-analysis, we use only the first study (studies 2, 3, and 4 analyze decision processes, not choice overload). This 2 × 2 study measures two separate dependent variables: the percentage of participants choosing from the larger assortment and participants' confidence with their selection. This article is thus responsible for four observations in our meta-analysis (coded as 6–9).
3. Research by Chernev (2003b) examines how preference uncertainty moderates the impact of assortment size on choice overload. Through four parallel studies, the dependent variable is operationalized as the percentage of subjects who switch their selection; in addition, the final study measures respondents' confidence in their decisions. Each study follows a 2 × 2 design in which one of the factors is assortment size and the other indicates whether there is an articulated ideal point. Consequently, these four studies are recorded as 10 separate observations (coded as 10–19; two observations apiece for studies 1–3 and four observations for study 4).
4. Research by Chernev (2005) examines how feature complementarity moderates the impact of assortment size on choice overload. The experimental task involves choice from within an assortment, and the dependent variable is operationalized as choice deferral—the percentage of participants who postpone a selection. In our meta-analysis, we use the second of three studies (studies 1 and 3 do not use assortment size as a moderator). The relevant study follows a 2 × 2 design and is responsible for two observations (coded as 20–21).
5. Research by Gourville and Soman (2005) presents three diverse studies dealing with the impact of assortment size on choice overload. Specifically, study 1 examines how alignability of product attributes moderates the impact of assortment on choice overload, operationalized as the percentage of respondents choosing from the larger assortment. The second study examines how the number of attributes of the available options influences consumer preferences for the larger assortment. The third study examines the impact of accountability. Generalizing to the conceptual factors, the first study examines the impact of choice set complexity (operationalized in

terms of alignability), while the latter two consider decision task difficulty (operationalized in terms of the number of attributes and decision accountability). Each study follows a 2 × 2 design (study 1 has five assortment-size conditions; we combine the two smallest and the two largest assortments to construct small and large sets). In total, this paper is responsible for six observations in our meta-analysis (coded as 22–27; two observations per study).

6. Research by Oppewal and Koelemeijer (2005) examines the impact of assortment size on choice overload when effort minimization is not a decision goal. From the perspective of the meta-analysis, this paper follows a 1 × 2 design in which all participants are variety seeking (the study has eight separate assortment size conditions; we combine the two smallest and the two largest assortments to construct small and large sets). Satisfaction with the assortment is the lone dependent variable, so we record a single observation (coded as 28).
7. Research by Chernev (2006) examines how decision focus moderates the impact of assortment size on choice overload. The experimental task involves choice among assortments, and the key dependent variable is operationalized as the percentage of participants who select each assortment. The third and fourth studies also measure choice satisfaction as a secondary dependent variable. The first three studies use a 2 × 2 design in which one of the factors is assortment size and the other is decision goal (choosing an assortment vs. choosing a specific option). The fourth study uses a 2 × 2 × 2 design (the additional moderator is the presence of a dominant option); for the purposes of meta-analysis, we focus only on the control condition of the third factor, which results in a 2 × 2 design. Overall, this paper is responsible for twelve total observations (coded as 29–40; two observations each for studies 1 and 2; four observations each for studies 3 and 4).
8. Research by Lin and Wu (2006) examines how the need for cognition moderates the impact of assortment size on choice overload. The dependent variable is regret, which is operationalized as the willingness to switch to another option. In a single 2 × 2 study, subjects are split into conditions by assortment size and need for cognition, which determine whether or not they have an effort-minimization goal. Even though this design lends itself to two meta-analytic observations, the data reported in the low-need-for-cognition condition had a much smaller variance (more than 12 times smaller than the other condition's reported variance) and was excluded from the analysis. Accordingly, this paper accounts for one observation (high need for cognition) in our meta-analysis (coded as 41).
9. Research by Shah and Wolford (2007) examines the impact of assortment size on choice overload without moderators. This is a single-factor (assortment size) study that measures the percentage of participants who select any option (we combined the eight assortment-size conditions to construct small and large sets). Accordingly, we record a single observation in the meta-analysis (coded as 42).
10. Research by Mogilner et al. (2008) examines how the existence of an ideal point moderates the impact of assortment size on choice overload. Satisfaction with the chosen alternative operates as the dependent variable. In the meta-analysis, we utilize a subset of the third study (the others do not manipulate assortment size), which has a 2 × 2 setup. One of the factors is assortment size and the other indicates whether there is an articulated ideal point. Accordingly, we record two observations from this paper (coded as 43–44).
11. Research by Chernev and Hamilton (2009) examines how option attractiveness moderates the impact of assortment size on choice overload. The experimental task involves choice among assortments, and the dependent variable is operationalized as the percentage of participants who select each assortment. In our meta-analysis, we use the first five studies (the sixth study does not directly measure choice overload). All five studies follow 2 × 2 designs in which one of the factors is assortment size and the other is the attractiveness of the available options (study 4 has three assortment size conditions; for the meta-analysis, we consider only the smallest and largest sets). Therefore, in our meta-analysis these five studies are recorded as ten separate observations (coded as 45–54; two observations per study).
12. Research by Fasolo et al. (2009) examines the impact of assortment size on choice overload. The experimental task involves choice from an assortment, and the dependent variable is operationalized as satisfaction with the chosen alternative. Study 1 utilizes a single-factor design and study 2 has a 2 × 2 design, which is treated as comprising two simple effects. Consequently, this article is responsible for a total of three observations (coded as 55–57; one observation for the first study and two for the second).
13. Research by Haynes (2009) examines how time pressure moderates the impact of assortment size on choice overload. In this paper, there are two dependent variables as participants report their satisfaction and regret with the chosen alternative. The article involves a single study with a 2 × 2 design, which is responsible for a total of four observations (coded as 58–61; two per dependent variable).
14. Research by Scheibehenne et al. (2009) presents three sets of studies dealing with the impact of assortment size on choice overload. Whereas the first two sets measure choice deferral as the dependent variable, the third records choice satisfaction. The first study follows a 1 × 2 design without any moderators. In the second set of studies, 2a utilizes expertise to moderate preference uncertainty, 2b has no moderator, and 2c requires subjects to justify their selections, thereby altering the difficulty of the decision task. Study 2a follows a 2 × 2 design, while 2b and 2c have 1 × 2 setups. (Studies 2b

and 2c have three assortment size conditions; for the meta-analysis, we consider only the smallest and largest sets.) Finally, the third set of studies consists of two equivalent 1 × 2 within-subject designs; all participants are primed to gain expertise, which results in low preference uncertainty. Accordingly, this paper accounts for seven total observations (coded as 62–68; two observations for study 2a and one observation apiece for studies 1, 2b, 2c, 3a and 3b).

15. Research by Sela et al. (2009) examines the impact of product type—utilitarian or hedonic—on choice overload and selection. Throughout the dependent variable is measured as the percentage of respondents choosing a hedonic option (we focus on the assortments with an equal number of utilitarian and hedonic goods). The paper consists of six studies. Studies 1a, 1b, 2, and 3 have no moderators, while 4 and 5 examine how choice set complexity (operationalized in terms of ease of justification that creates a dominant product or category) moderates the impact of assortment on choice overload. Accordingly, studies 1–3 follow 1 × 2 designs, whereas studies 4 and 5 have 2 × 2 set-ups. In our meta-analysis, these six studies are recorded as eight separate observations (coded as 69–76; one observation each for studies 1a, 1b, 2 and 3; two observations each for studies 4 and 5).
16. Research by Diehl and Poynor (2010) examines the impact of assortment size on choice overload. The experimental task involves a choice within an assortment, and the dependent variable is operationalized as choice satisfaction. In our meta-analysis, we include studies 2 and 3 (study 1 does not directly manipulate assortment size). Both utilize 1 × 2 experimental designs, accounting for a total of two observations (coded as 77–78; one from each study).
17. Research by Greifeneder et al. (2010) examines how decision task difficulty moderates the impact of assortment size on choice overload. In two similar studies, the dependent variable is recorded as satisfaction with the chosen alternative. Both studies manipulate the number of product attributes in a 2 × 2 design, and they are collectively responsible for four observations (coded as 79–82; two observations per study).
18. Research by Inbar et al. (2011) examines the impact of assortment size on choice overload. The experimental task involves choice from an assortment, and the dependent variable is operationalized as regret with the chosen alternative. In our meta-analysis, we use the first two studies (the third study has a different focus). Study 1 follows a 1 × 2 design without any moderating variable; study 2 follows a 2 × 2 design and examines how time pressure (the feeling of being rushed) influences the impact of assortment size on choice overload. Accordingly, this article is responsible for three observations (coded as 83–85; one for study 1 and two for study 2).
19. Research by Goodman and Malkoc (2012) examines how psychological distance moderates the impact of assortment size on choice among assortments. The experimental task involves choice among assortments, and the dependent variable is operationalized as the percentage of participants who select each assortment. In our meta-analysis, we use the first five studies (the sixth study does not directly measure choice among assortments). Studies 1A, 1B, 2, and 3 follow a 2 × 2 design, in which one of the factors is assortment size and the other is the psychological distance. Study 4 uses a 2 × 2 × 2 design (the additional moderator is the prominence of the choice tradeoffs); for the purposes of meta-analysis, we focus only on the control condition of the third factor, thus resulting in a 2 × 2 design. Consequently, this paper is responsible for ten observations (coded as 86–95; two for each study).
20. Research by Morrin et al. (2012) examines how expertise moderates the impact of assortment size on choice. The experimental task involves choice among assortments, and the dependent variable is operationalized as the percent of participants who select an alternative. In the meta-analysis, we utilize the first study (the other studies do not manipulate assortment size). This study uses a 2 × 2 × 2 design (the third factor is the existence of a default option [target fund]); for the purposes of meta-analysis, we focus only on the control condition of the third factor, thus resulting in a 2 × 2 design. Accordingly, this paper is responsible for two observations in the meta-analysis (coded as 96–97).
21. Research by Townsend and Kahn (2014) examines how presentation format moderates the impact of assortment size on choice overload. The experimental task involves choice among assortments, and the dependent variable is operationalized as the percentage of participants who select each assortment. In our meta-analysis, we focus on study 5 (studies 1 and 2 do not assign experimental conditions randomly, and studies 3 and 4 do not directly measure overload). Study 5 has a 2 (presentation format: verbal vs. visual) × 2 (assortment size: high vs. low) experimental design. Accordingly, this paper accounts for a total of two observations (coded as 98–99).

The data used in the meta-analysis were obtained directly from the published papers with the exception of cases in which the published version of the paper did not report all of the data necessary to calculate effect sizes (Chernev, 2003a, 2006; Mogilner et al., 2008; Oppewal & Koelemeijer, 2005; Lin & Wu, 2006; Townsend & Kahn, 2014; Goodman & Malkoc, 2012; Morrin et al. (2012); Ketcham et al., 2012). In such cases, additional data were obtained by contacting the authors. The additional data for the studies by Greifeneder et al. (2010) and Scheibehenne et al. (2009) were obtained from the dataset used by Scheibehenne et al. (2010). We were unable to obtain the necessary data from three papers (Huberman et al., 2007; Ketcham et al., 2012; Reutskaja & Hogarth, 2009) and accordingly did not include these papers in the meta-analysis.

Appendix B. Reanalyzing the data from prior meta-analytic research

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jcps.2014.08.002.

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