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RESEARCH ARTICLE

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"Autonomous, yet Connected": An esthetic principle explaining our appreciation of product designs

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Abstract

Esthetic principles describe the levels or combination of design dimensions that are esthetically appreciated. Current principles focus on dimensions connected to product design itself (e.g., unity and variety) or dimensions that refer to a product design's relationship to other product designs (e.g., typicality and novelty). However, product design also has a social significance—they help consumers shape their identity—and this social dimension has hitherto been overlooked in research on esthetic appreciation. In this paper, we propose and investigate the social esthetic principle "Autonomous, yet Connected." In four studies, we show that a product's design leads to the highest esthetic appreciation if it strikes an optimal balance between nurturing the two seemingly opposite needs for connectedness and autonomy. Further, we show how conditions of safety and risk moderate the effects of the principle, which suggests our principle may have evolutionary grounding.

KEYWORDS
esthetic appreciation, autonomy, connectedness, product design, social needs

1 | INTRODUCTION

Research suggests that design appearance can have many positive effects. For example, esthetically appealing products may positively influence purchase decisions, quality perception, and retention (Bloch, 1995; Campbell & Goodstein, 2001; Homburg, Schwemmle, & Kuehnl, 2015; Schnurr & Stokburger-Sauer, 2016). Accordingly, many different esthetic principles and phenomena have been proposed and been empirically tested that describe the relationship of (combinations of) design dimensions with esthetic appreciation (e.g., moderate complexity, preference-for-prototypes, moderate congruity, and Most Advanced, Yet Acceptable [MAYA]; Berlyne, 1971; Loewy, 1951; Mandler, 1982; Meyers-Levy & Tybout, 1997; Noseworthy & Trudel, 2011; Veryzer & Hutchinson, 1998).

Taken together, the dimensions studied in relation to esthetic pleasure are either inherent to design (e.g., unity) or are relative to other products of the same categories (e.g., typicality). However, product design properties may not only be processed in relation to other properties of a design or in relation to existing knowledge about a product category's typical design, but also in relation to what these design properties communicate symbolically to other people. Consumers use product designs to infer social information about their relationships with others and to communicate something about themselves to others (Belk, 1988; Dittmar, 1992; Kleine, Kleine, & Kernan, 1993). Hence, product designs are processed with a potential fulfillment of certain social concerns in mind (Bloch, 1995). In fact, Bloch discussed three moderators of consumer responses to product design wherein products are assessed by consumers relative to their own inherent properties, relative to their category or what people are used to, and thirdly relative to consumers' social subgroups. Although empirical evidence exists for esthetic principles of the first two kinds, the role that social concerns can play in explaining esthetic pleasure has largely been ignored since Bloch first implored marketers to be aware of this. No principle explaining esthetic pleasure on the basis of social concerns has been proposed and investigated yet. Considering that recent research shows the importance of social symbolism in a product design for commercial success (willingness to pay, purchase intention, and word of mouth; Homburg et al., 2015), we contribute by proposing a new esthetic principle, the

social esthetic principle "Autonomous, yet Connected," and show its relevance to consumers' esthetic experiences.

2 | SOCIAL ESTHETIC PRINCIPLE

In this study, we consider esthetic pleasure as "disinterested" (Kant, 1951) or "distanced" (Bullough, 1912) in that no motive other than perceiving the object of perception as such is involved in generating the esthetic response. In line with Dutton (2009), we thus define esthetic pleasure as the pleasure people derive from processing the object *for its own sake*, as a source of immediate experiential pleasure in itself, and not essentially for its utility in producing something else that is either useful or pleasurable. This does not imply that recognizing an object's purpose cannot induce esthetic pleasure; rather it means that actual fulfillment of a need or actual use of the object is not a prerequisite for an esthetic response (Hekkert, 2014).

In the existing literature, different phenomena and principles have been described and empirically tested that predict a relationship between esthetic pleasure and certain (levels of) product dimensions (e.g., moderate complexity, preference-for-prototypes, moderate congruity, MAYA; Berlyne, 1971; Loewy, 1951; Mandler, 1982; Meyers-Levy & Tybout, 1997; Noseworthy & Trudel, 2011; Veryzer & Hutchinson, 1998). These esthetic principles and phenomena distinguish themselves from each other based on how a product design is processed in relation to different reference points (Berghman & Hekkert, 2017; Hekkert, 2014). For example, the general preference-for moderate complexity and the unity-in-variety principle are the result of processing intrinsic properties of a product design (Cupchik, Spiegel, & Shereck, 1996; Fechner, 1876; Post, Blijlevens, & Hekkert, 2016), whereas the moderate congruity theory and the MAYA principle result from comparing a design with other members of a product category that are stored in a person's knowledge system.

In this paper, we propose a new esthetic principle, "autonomous, yet connected," that distinguishes itself from other esthetic principles in that it considers a product design in relation to an entirely different reference point: the degree to which a product design potentially meets our social concerns of relatedness and autonomy (e.g., Deci & Ryan, 2000). It is well accepted that consumers are affected by social concerns in the consumer decision-making process. Fishbein and Ajzen's (1975), Theory of Reasoned Action and Ajzen's (1985) Theory of Planned Behavior propose that consumers are influenced by social norms in the consumption context; consumers tend to comply to the social norm if they believe that they are expected to behave as such by friends, family, or society and will, therefore, choose to consume products that fit with the social norm (e.g., smoke cigarettes). Advancing this knowledge to product designs (i.e., the physical appearance of a product) specifically, it has since been accepted that product designs communicate things about people and are used as social symbols to others. Consumers use product designs to infer social information about their relationships with others and to communicate something about themselves to others (Belk, 1988; Dittmar, 1992; Kleine et al., 1993). Hence, product designs are processed in relation to what they communicate to others and consumer's assessment of whether they fit within the social norm may influence their consumption behavior (Belk, 1988; Dittmar, 1992; Homburg et al., 2015; Kleine et al., 1993). Even though the importance of product designs as social symbols is acknowledged in the literature, this social dimension of product design has hitherto been overlooked in research on esthetic appreciation, despite Bloch's (1995) explicit demand for marketing research to not ignore the effect that one's social concerns may have on consumer esthetic appreciation of product designs.

In his model on consumer responses to product design (i.e., form), Bloch (1995) discusses innate preferences, consumer characteristics, and cultural and social characteristics that may affect consumer's esthetic responses to product designs. When discussing innate preferences, Bloch describes how Gestalt laws influence our disposition to certain product designs, and the effects of such intrinsic design properties on esthetic appreciation have since been well-established (e.g., Muth & Carbon, 2013; Post et al., 2016; Veryzer & Hutchinson, 1998). Bloch further refers to consumer characteristics such as design acumen and experience and thus the process of assessing product designs in relation to what consumers are accustomed to. The effect of, for example, typicality and familiarity with product designs on esthetic appreciation has since also been thoroughly investigated (Blijlevens, Carbon, Mugge, & Schoormans, 2012; Hekkert, Snelders, & Wieringen, 2003; Landwehr, Wentzel, & Herrmann, 2013; Reber, Schwarz, & Winkielman, 2004). We contribute to the development of this literature on consumers' esthetic appreciation of product designs by suggesting an esthetic principle that taps into consumers' social concerns and by showing its relevance for consumers' esthetic experiences: the esthetic principle of "Autonomous, yet Connected."

3 | DEVELOPMENT OF THE PRINCIPLE "AUTONOMOUS, YET CONNECTED"

Prior research has focused on examining the effects of one design dimension (e.g., complexity and typicality) on esthetic appreciation and providing psychological explanations of these effects. For example, Berlyne (1971) first proposed an inverted U-shaped relationship of arousal with esthetic pleasure and showed how this explained people's preference-for moderately complex stimuli over highly complex or simple stimuli. The appreciation of typicality is explained through processing fluency (Reber et al., 2004; Winkielman & Cacioppo, 2001). There is also research that has focused on examining esthetic principles that hinge on the idea that consumers prefer a balance between two seemingly opposing design factors (Berghman & Hekkert, 2017; Hekkert, 2014). This study suggests that the potential negative effect of maximizing one dimension can be offset by maximizing the orthogonally related dimension. Two well-known examples of such esthetic principles are the MAYA principle (Hekkert et al., 2003; Loewy, 1951) and the Unity-in-Variety principle (Post et al., 2016),

which explain esthetic appreciation as a result from maximizing two seemingly contradictory dimensions both positively related to esthetic pleasure, respectively typicality and novelty, and unity and variety. The theory that has been put forward in the literature to explain the workings of these types of maximization esthetic principles is the evolutionary psychological perspective on esthetic appreciation (see, e.g., Hekkert, 2014), which we adapt to guide the development of our social esthetic principle.

The evolutionary psychological perspective on esthetic appreciation states that esthetic appreciation directs beneficial behavior for people's survival (Lindgaard & Whitfield, 2004; Tooby & Cosmides, 2001). Two evolutionary drivers that operate to ensure survival are the needs for safety and the preservation of life, which is realized through safety or security-seeking behavior, and the need for accomplishment, which is realized through exploration and behavior to promote learning (Damasio, 1994). Previous research showed that these evolutionary needs still direct people's behavior today (Griskevicius & Kenrick, 2013; Kenrick, Saad, & Griskevicius, 2013), and explain the esthetic appreciation derived from objects of today's world, including product designs, art, and other manmade objects (Hekkert, 2014). More specifically, the simultaneous fulfillment of both evolutionary needs through maximizing seemingly opposing design dimensions in a product's design elicits the highest esthetic appreciation for that object. Indeed, Post et al. (2016) show how the needs for safety and accomplishment underlie the unity-in-variety principle. Applying this to the social dimension, we have identified two social needs that align with the evolutionary needs for safety and accomplishment: the needs for *connectedness* and *autonomy*.

The need for *connectedness* is described as an inherent social need that involves the desire to feel connected to others (Deci & Ryan, 2000) and to have a sense of closeness with others (Baumeister & Leary, 1995; Brewer, 1991). Literature shows that the desire to form and maintain social bonds has survival and reproductive benefits as groups can share food, provide mates, and help care for offspring (Ainsworth, 1989; Axelrod & Hamilton, 1981; Bowlby, 1969). Thus, through connecting with other human beings and maintaining group affiliation, humans nurture their evolutionary need for *safety*.

At the same time, people also have an inherent need to feel *autonomous* (Lynn & Harris, 1997a; Lynn & Snyder, 2002; Snyder & Fromkin, 1977). This need involves a desire to see oneself as a unique and differentiated being and as being free and in control of oneself (Bettencourt & Sheldon, 2001; Brewer, 1991; Deci & Ryan, 2000). Humans who succeed in positively standing out gain status and respect; in this way, people achieve greater interpersonal influence, more material resources, higher self-esteem, and better health (Griskevicius & Kenrick, 2013; Marmot, 2004). Moreover, standing out is beneficial for finding a mate within the group of people you are connected to (Griskevicius & Kenrick, 2013). By emphasizing autonomy, people conform to the evolutionary need for *accomplishment*.

The choice for the two concerns of connectedness and autonomy is not only warranted by evolutionary theory, but also by the fact that these concerns have been shown to be of importance in the consumption context. For example, Fisher and Price (1992) showed conditions under which one of the concerns for uniqueness and belonging would take precedence over the other in the consumption context. Chan, Berger, and Van Boven (2012) provided the first evidence that these two social concerns of uniqueness and belonging can interplay in the consumption context through brand choices. They showed that consumers, when a brand is associated with a group they feel affiliated to (e.g., a BMW vs. a Chevrolet), will compensate this by choosing a less popular product within the offering of that brand to feel unique within that group. Hence, first evidence exists showing that these social concerns of connectedness and autonomy are of relevance in the consumption context. Applying this to the context of an esthetic appreciation of product designs, we propose and investigate the following hypothesis: A product's design leads to the highest esthetic appreciation when it strikes an optimal balance between nurturing a consumer's need for connectedness and the need for autonomy simultaneously.

In four studies, we test this social esthetic principle "Autonomous yet Connected" and its capacity for explaining esthetic pleasure for product designs. Further, we investigate whether and how safety and accomplishment factors (e.g., the social risk associated with a product category, chronic regulatory focus, risky vs. safe experimental task conditions) shift the preferred balance of connectedness and autonomy nurtured by product designs.

4 | STUDY 1

In this study, we put the esthetic principle "Autonomous, yet Connected" to a first test by assessing whether product designs can make people feel connected and autonomous at the same time, and whether maximizing both leads to the highest esthetic appreciation.

H1 *A product's design leads to the highest esthetic appreciation when it strikes an optimal balance between nurturing a consumer's need for connectedness and the need for autonomy simultaneously.*

4.1 | Method

4.1.1 | Stimuli

The product categories *sunglasses* and *bicycles* were chosen to serve as stimuli as they are considered to be public rather than privately consumed, and therefore are used in a social context. We chose two product categories to assess generalizability over product categories. From each category, 12 product designs were selected that together represented the broad range of product designs currently found in the market, thus exhibiting variation on many design properties (such as color, shape, and materials used; see Figure 1). Moreover, we chose a range of stimuli that we believed display a wide variation in communicating connectedness and autonomy. Any brand identification was removed from the stimuli.

FIGURE 1 Examples of sunglasses and bicycle stimuli used in Study 1 [Color figure can be viewed at wileyonlinelibrary.com]

4.1.2 | Respondents

The two product categories sunglasses and bicycles were rated by 81 Dutch respondents, and then their answers were checked. After omitting flat liners (as an indication of not taking the questionnaire seriously: e.g., on Likert-scale questions choosing mostly consecutive 1's only, mostly consecutive 4's only, or mostly consecutive 7's only), the final analyses were performed over 77 respondents (mean age = 34.29; *SD* = 9.04; 46 males). As each respondent rated 12 designs, the nonaggregated data set created a total of 924 data points to use in the analyses (greater than a priori calculation of 146 based on $f^2 = 0.15$, $\alpha = 0.05$, 1-$\beta = 0.95$, IV = 6 G*Power3.1; indicative of an estimated power of 0.8 at a medium effect size of 0.6 when considering the linear mixed model design of this study). Respondents were recruited from a consumer panel and through snowballing within a population representative of a Dutch medium-sized city to finish an Internet-based questionnaire. Respondents received either a reward equivalent to 2.50–10 euros or were voluntarily put into a prize draw for winning a 200-euro voucher; the different rewards were found to have no effect on the results.

4.1.3 | Procedure

All respondents received all 12 stimuli from one product category and were asked to judge these on several constructs, which were measured on 7-point Likert scales ("completely disagree" and "completely agree"). Stimuli were presented in random order. The questionnaire was filled in online through NetQuestionnaires. First, participants rated product designs on esthetic appreciation with items that were validated by Blijlevens et al. (2017): "this is an attractive (bicycle)," "this (bicycle) is nice to see," and "I like to look at this (bicycle)."[1] These items were then averaged into one measure for esthetic appreciation (Cronbach's $\alpha = 0.966$).

We expected that people would be more prone to seek a balance in fulfilling the needs for connectedness and autonomy through a product's design in situations where they simultaneously attempted to affiliate with a group of people and also to differentiate within that *same* group. Hence, we attempted to create a situation wherein the items measuring connectedness and autonomy were framed towards people's "type of people" (Chan et al., 2012). Before participants were asked to rate product designs on connectedness and autonomy, they received the following instruction to assure they rated the product designs on connectedness and autonomy with reference to the group of people with whom they felt affiliated (their "type of people"):

> *You will be asked to rate product designs on what they mean to you in relation to your 'type of people.' With your 'type of people,' we refer to the people to whom you mirror yourself and that you compare yourself with. They are more or less like you and you feel a good fit with them. Sometimes they are easily defined (e.g., businessmen and students), but often you can't. However, you do probably have a clear idea of who your type of people are. When answering the following questions, please keep your type of people in mind. Please take some time to think of whom 'your type of people' are.*

Functionality was measured to statistically correct for confounding factors, where the items used were "this product design is functional," "this product design is easy to use," and "this product design is user-friendly" (Cronbach's $\alpha = 0.935$).

Measurement of connectedness and autonomy

Typically, to assess whether there exists a balance between two seemingly opposing product factors that are the most esthetically appreciated, a regression model is fitted wherein data measuring the perceived presence of these factors is regressed on the dependent variable *esthetic appreciation* (Hekkert et al., 2003; Post et al., 2016). In the personality and social psychology literature, scales exist that measure people's need for connectedness and autonomy or uniqueness (Leary, Kelly, Cottrell, & Schreindorfer, 2013; Lynn & Harris, 1997a, 1997b; Snyder & Fromkin, 1977); however, a scale to measure whether an object (such as product design) can make people feel connected or autonomous does not as yet exist. Hence, we developed a scale to measure the level to which a product appearance makes people feel connected and autonomous.

Items were gathered by extensively searching through the personality and social psychology literature and then rephrased to pertain to product design. Five independent researchers (two with a design background, two with a background in consumer research, and one with a social psychology background) assessed 12 items for connectedness and 17 items for autonomy on "How good a measure is each item for the (connectedness/autonomy) of product designs on a scale from 1 to 5, with 5 being a good measure of (connectedness/autonomy)?" (see Appendix A).

Results showed that items that pertain to communicating an emotional relationship with others (e.g., "my happiness depends on others," and "I am in a positive relationship with others") were deemed less useful (score <3) for measuring connectedness communicated by product designs than items pertaining more to affiliation to other people (e.g., "I feel affiliated," "I share values with," and "they are important to me"). With regard to autonomy, items that pertain to distinguishing from

[1]Note that all five items were measured in all studies, but two items were not recorded in Study 1 for half of the participants ("this is a beautiful [bicycle]" and "This [bicycle] is pleasing to see"). Therefore, to assure consistent comparison of results across studies we chose to analyze all results with these three items only.

TABLE 1 Factor loadings for all items on the constructs connectedness and autonomy

	Component	
	Connectedness	Autonomy
This product design makes me feel connected to my type of people	0.921*	*−0.008*
This product design makes me feel affiliated with my type of people	0.902	*−0.059*
This product design makes me belong to my type of people	0.902	*−0.024*
This product design shows that I am similar to my type of people	0.894*	*−0.114*
This product design helps to show off my membership to my type of people	0.887	*0.020*
This product design communicates that I value the same things in life as my type of people	0.873	*0.026*
This product design helps to be accepted by my type of people	0.862	*0.062*
This product design shows that I care about what my type of people think	0.840	*0.073*
This product design shows that I take the opinions into account of my type of people	0.812*	*0.039*
My type of people own this or a highly similar product design	0.807	*−0.269*
This product design helps me to be unique towards my type of people	*−0.128*	0.899
This product design helps to emphasize my individuality towards my type of people	*−0.001*	0.889*
This product design helps to distinguish myself from my type of people	*−0.140*	0.877*
This product design communicates to my type of people that I do my own thing	*−0.082*	0.876*
This product design shows that I do things differently from others	*−0.028*	0.865
This product design shows to my type of people that I am different from them	*−0.190*	0.862
This product design helps to express my personal identity towards my type of people	*0.097*	0.857
This product design shows to my type of people that I depend on myself rather than on them	*0.075*	0.777
This product design expresses an authentic part of me towards my type of people	*0.201*	0.763

*Items used in Studies 2, 3, and 4.

others (e.g., "I am independent" and "I am a unique individual") were deemed more suitable than items pertaining to a person's private sense of self-worth (e.g., "I am true to myself" and "I am self-sufficient").

Finally, 10 items were generated based on existing scales for connectedness. These were modified to measure connectedness, and nine items were selected and modified to measure autonomy (see Table 1). Hence, a combination of quantitative and qualitative data was used to assess the face validity of the items so as to measure the constructs' connectedness and autonomy as experienced through product designs (Rossiter, 2002). An exploratory factor analysis with varimax rotation yielded two independent factors with ten items measuring the construct connectedness (which were averaged to form an overall measure for connectedness; Cronbach's $\alpha = 0.964$), and nine items measuring the construct autonomy (which were averaged to form a measure for autonomy; Cronbach's $\alpha = 0.953$). A principal components analysis was run to predict factors from the observed variables. This way the factor scores can be read as regression coefficients in a model predicting the dependent, latent construct. This information is useful to gain a good understanding of how all items contribute to the latent factors connectedness and autonomy.

4.2 | Results

The analyses in all studies were performed on nonaggregated data, as data aggregation can lead to inflation of correlation and effect sizes (Clark & Avery, 1976). To assess whether connectedness and autonomy simultaneously influence esthetic appreciation, data were analyzed using linear mixed models (LMMs). These models take the systematic variability of participants into account by modeling the dependencies as random effects, thus allowing for a more accurate estimation of the factors of interest and permitting generalization to the entire population (Baayen, Davidson, & Bates, 2008; Judd, Westfall, & Kenny, 2012). This is accepted as a better representation of the data to a regression model in which the data are fitted on one singular slope with a fixed intercept. In the LMM that we fitted to the data, the "variability" accounted for is the intercept of that line. All subsequent linear mixed models were performed using IBM SPSS Statistics for Windows, Version 24.0 (IBM Corp., Armonk, NY) which uses Satterthwaite's approximation to calculate the denominator degrees of freedom. We performed linear mixed model analyses with by-participant crossed random intercepts, allowing for baseline differences in connectedness and autonomy scores (Carson & Beeson, 2013): this model was compared with one without random intercepts for participants. A χ^2 likelihood ratio test on the −2 log-likelihood (−2LLs), obtained by the maximum likelihood estimation, determined whether the models significantly differed in fit. Results showed that the model including the by-participants random effects fit the data better than the model without random intercepts, $\chi^2(1) = 52.48$; $p < 0.001$.[2]

A linear mixed model was fitted on esthetic appreciation as a dependent variable with the independent variables connectedness and autonomy, and this model was compared with one that included

[2]Similarly, an LMM was tested with by-stimulus crossed random intercepts versus one without random intercepts. This model showed no significant better fit.

TABLE 2 Summary of linear mixed model analyses for the predictors' connectedness, autonomy, covariate functionality, and product category and its interaction variables from Study 1

Model summary	−2LL(1,9) = 3025.91			
Predictors	***F***	***β***	***SE***	**95% CI**
Connectedness	289.31	1.09**	0.064	0.965, 1.22
Autonomy	5.96	0.174*	0.071	0.034, 0.314
Functionality	55.42	0.362**	0.049	0.267, 0.458
Product category	12.14	0.493**	0.142	0.211, −0.776
Product Category × Connectedness	21.70	−0.422**	0.091	−0.600, −0.244
Product Category × Autonomy	25.26	−5.049**	0.100	0.308, 0.702

Note. CI: confidence interval; −2LL: −2 log-likelihood. *$p < 0.05$, **$p < 0.01$.

product category and all interaction terms as independent variables. A χ^2 likelihood ratio test on the −2LLs, obtained by the maximum likelihood estimation determined whether the models significantly differed in fit. Results showed that the model including product category and its interaction terms fit the data better than the model without these included, $\chi^2(3) = 65.08$; $p < 0.001$. This indicates that there are differences in the effects of autonomy and connectedness on esthetic appreciation between product categories (see Table 2). All correlations between the variables are found in Table 3.

To explore this further, two separate LMMs were performed for each product category. Autonomy had a significantly larger and connectedness a significantly smaller effect on esthetic appreciation for bicycles than for sunglasses (see Table 4a,b; see Table 5 for means for each variable in the model for each category separately). Hence, both autonomy and connectedness have a positive effect on esthetic appreciation for products from the two categories. However, autonomy is relatively more important and connectedness less important when explaining the esthetic appreciation for bicycles as compared to sunglasses.

In addition, the graphs show that, on average, the product designs that communicate connectedness and autonomy simultaneously are more esthetically pleasing than if only one or the other is communicated (see Figure 2a,b).

4.3 | Discussion

Congruent with our hypothesis, we find positive linear relationships of connectedness and autonomy with esthetic appreciation for product designs. Moreover, on average, if a product design makes people feel both connected and autonomous simultaneously, it results in a higher esthetic appreciation than if they only feel connected or only autonomous.

We found that autonomy had a larger effect on esthetic appreciation for bicycles than for sunglasses, and connectedness had a larger effect on esthetic appreciation for sunglasses than for bicycles. More specifically, for bicycles autonomy and connectedness are equally important in explaining esthetic appreciation, whereas for sunglasses connectedness plays a larger role in explaining esthetic appreciation than does autonomy. A possible explanation could be that social risk of the product category (Brooker, 1984; Kaplan, Szybillo, & Jacoby, 1974) moderates the effects of autonomy and connectedness on esthetic appreciation. Social risk is defined as the level to which a choice for a certain product will "affect the way others think of you" (Kaplan et al., 1974, p. 1; Figure 1), and previous research has shown that perceived risk moderates consumers' preferences towards what is familiar and the norm (and thus safe; Campbell & Goodstein, 2001; Erdem & Swait, 1998). If we assume that the evolutionary needs for safety and accomplishment underlie the relationship of esthetic appreciation with connectedness and autonomy, respectively, then we can expect that the level of perceived social risk (Kaplan et al., 1974) will influence whether a person prefers product designs that communicate connectedness more or product designs that communicate autonomy more.

When people find themselves in a risky situation, they are motivated to increase their safety (Bettman, 1972; Dowling, 1986). Hence, if sunglasses are socially more risky (e.g., as they are immediately visible in the face and an acknowledged fashion object), then people may feel inclined to prefer a design that helps to fit in with their type of people relatively more, which would explain why connectedness influences esthetic appreciation more than autonomy. However, when a situation feels safe enough, people more easily see an opportunity to explore and accomplish new things.

Research with children showed that intrinsic motivation to fulfill autonomy is more likely to flourish in contexts characterized by a sense of secure relatedness (Bretherton, 1987; Deci & Ryan, 2000; La

TABLE 3 Bivariate Pearson's correlations between all variables in the model from Study 1

	Esthetic pleasure	Connectedness	Autonomy	Functionality
Esthetic pleasure	1	–	–	–
Connectedness	0.516**	1	–	–
Autonomy	0.127**	−0.063	–	–
Functionality	0.332**	0.381**	−0.177**	–

Note. **$p < 0.01$.

TABLE 4 Summary of linear mixed model analyses for the predictors' connectedness, autonomy, and covariate functionality for (a) sunglasses and (b) bicycles from Study 1

Model summary	−2LL(1,6) = 1351.949			
Predictors	***F***	***β***	***SE***	**95% CI**
(a) Sunglasses				
Connectedness	315.88	1.05***	0.059	0.936, 1.169
Autonomy	7.304	0.170**	0.0630	0.046, 0.294
Functionality	55.594	0.465***	0.0624	0.342, 0.588
Model summary	**−2LL(1,6) = 1650.999**			
Predictors	***F***	***β***	***SE***	**95% CI**
(b) Bicycles				
Connectedness	86.278	0.731***	0.079	0.576, 0.885
Autonomy	65.527	0.651***	0.080	0.493, 0.809
Functionality	12.732	0.261***	0.073	0.117, 0.405

Note. CI: confidence interval; −2LL: −2 log-likelihood. **$p < 0.01$. ***$p < 0.001$.

Guardia, Ryan, Couchman, & Deci, 2000; Ryan & La Guardia, 2000). Thus, when safety is sufficiently provided, there is room to explore; consequently, the need for accomplishment becomes more important. The current research was performed in the Netherlands, where bicycles are a very common mode of transportation and are less seen as a fashion item. We can therefore assume that bicycles are perceived to be less socially risky than sunglasses. Along this line of thought, we can theorize that for product designs that have no or very low social relevance, the balance will shift towards a higher contribution of autonomy over connectedness in explaining esthetic appreciation. In the next study, we assess whether this is the case by using a socially "safe" category of products as stimuli, namely, staplers.

5 | STUDY 2

In this study, the aim was to provide a test of whether high social safety associated with a product category can shift the preferred balance to autonomy over connectedness. We used staplers as stimuli as they are regarded as privately consumed and therefore less socially risky than bicycles or sunglasses. As the product category, staplers can be considered socially safe, people have more room to explore and are therefore more inclined to communicate their autonomy. We hypothesize the following:

H2 For socially safe products, autonomy is more important in explaining esthetic appreciation than connectedness.

5.1 | Method

5.1.1 | Stimuli

In this study, six designs of *staplers* were chosen as stimuli (see Figure 3). This product category was selected as staplers are considered to have low social relevance. Product designs were chosen that together represent the broad range of product designs that are currently found in the market, and thus varied on many physical design aspects (such as color, shape, and materials used). Six instead of 12 stimuli were chosen so as to reduce the respondent workloads.

5.1.2 | Respondents

A total of 113 Dutch respondents were recruited from a consumer panel. Respondents received reward points for participation that could be exchanged for goods in an online shop when enough reward points were saved; a common compensation for respondents from this consumer panel. After deletion of flat liners, the final analyses were performed with a total of 97 respondents (mean age = 31.91; *SD* = 8.29; 48 females). As each respondent rated six designs each, the nonaggregated data set created a total of 582 data points to use in the analyses (greater than a priori calculation of 146 based on $f^2 = 0.15$, $\alpha = 0.05$, 1-$\beta = 0.95$, IV = 6 G*Power3.1).

5.1.3 | Procedure

All respondents received all stimuli to judge on several constructs that consisted of multiple items. Stimuli were presented in random order. The questionnaire was filled in online through NetQuestionnaires. No task fillers were used. The constructs were measured on 7-point Likert scales ("completely disagree" and "completely agree"). First, participants rated product designs on esthetic appreciation with the same items as used in Study 1 (Cronbach's $\alpha = 0.820$).

After the participants read the introduction of "their type of people" (see Study 1), they were asked to rate the staplers on connectedness and autonomy, which were each measured with three items to reduce the time that respondents spent filling in their questionnaires. Because in Study 1 all items had a factor loading above 0.75, any three items would statistically be able to capture the construct. However, to be sure that the full construct was captured, three that would conceptually cover all aspects of each construct were chosen.

For the construct connectedness, the item "This product design makes me feel connected to my type of people" was selected as it pertained to membership; "This product design shows that I take the opinions into account of my type of people" as it pertained to shared

TABLE 5 Means for each variable in the model for the product categories bicycles and sunglasses separately from Study 1

Product category	Esthetic pleasure	Connectedness	Autonomy	Functionality
Sunglasses	3.94	3.35	4.07	4.87
Bicycles	4.44	3.44	3.97	4.64

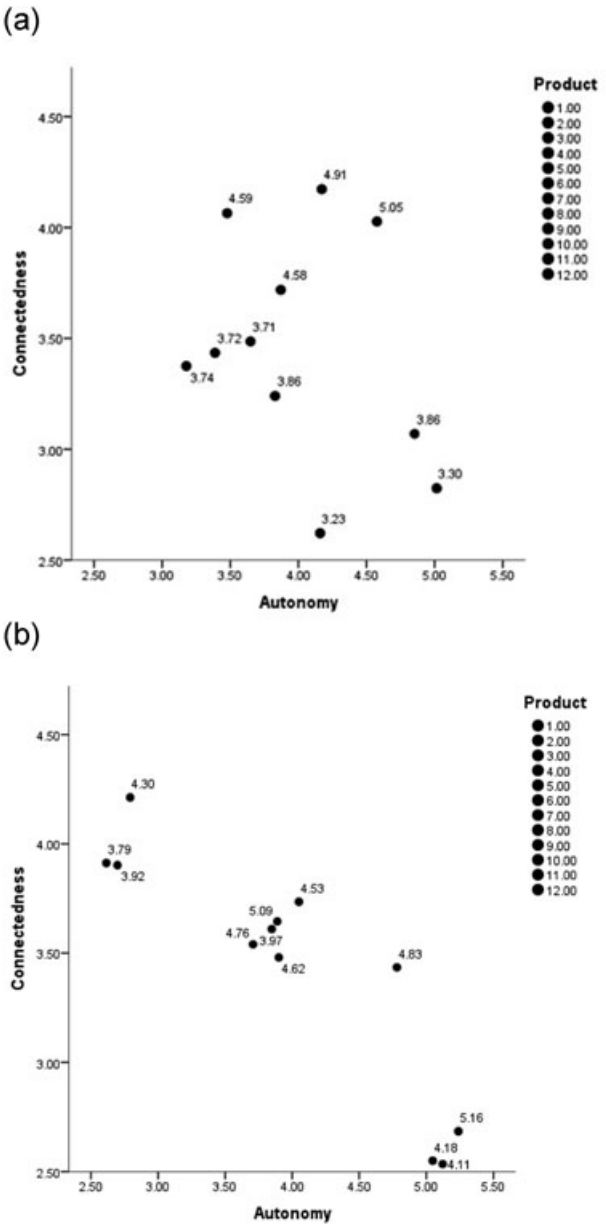

FIGURE 2 (a) The mean scores of each product with connectedness on the *Y*-axis and autonomy on the *X*-axis and their respective means on esthetic appreciation as indicators for sunglasses. (b) The mean scores of each product with connectedness on the *Y*-axis and autonomy on the *X*-axis and their respective means on esthetic appreciation as indicators for bicycles

values and "This product design shows that I am similar to my type of people" as it pertained to similarity (Cronbach's $\alpha = 0.876$).

For the construct autonomy, the item "This product design helps to emphasize my individuality towards my type of people" was selected as it pertains to a sense of self; "This product design communicates to my type of people that I do my own thing" as it pertains to individual behavior; and "This product design helps to distinguish myself from my type of people" as it pertains to dissimilarity (Cronbach's $\alpha = 0.850$). The items to measure functionality were the same as in Study 1 (Cronbach's $\alpha = 0.881$).

Finally, respondents were asked to rank order the product categories "sunglasses," "bicycles," and "staplers" on how socially risky they are, based on our explanation of social risk (adapted from Kaplan et al., 1974):

> *A product category is socially risky if you feel as though your choice for a certain product within that category (e.g., a specific bicycle from the category bicycles, a specific stapler from the category staplers, or a specific pair of sunglasses from the category sunglasses) influences the way people think about you. A product category can also be socially risky if you think it is important to receive positive feedback on your choice, and if your choice for a certain product within a category is influenced by how others may judge you.*

5.2 | Results

5.2.1 | Manipulation check

A Friedman test showed that the three product categories significantly differed in perceived social risk ($\chi^2 = 80.495$; $p < 0.001$). A Wilcoxon signed-ranks test showed significant differences in social risk between staplers ($M_{rank} = 2.74$) and bicycles ($M_{rank} = 1.67$; $Z = -7.26$; $p < 0.001$) and staplers and sunglasses ($M_{rank} = 1.59$; $Z = -6.96$; $p < 0.001$) with staplers being the least risky.

5.2.2 | Hypotheses

A linear mixed model was run, but the model indicated that the final Hessian matrix was not positive definite. Further inspection showed no variance in the intercepts (covariance parameter estimate and its *SE* were both zero), indicating that a linear mixed model is not the best fit for the data. Accordingly, general least squares regressions were performed generating bootstrap 95% confidence intervals (CIs) for 1,000 bootstrap samples. A regression model was fitted on esthetic appreciation as a dependent variable with the independent variables connectedness and autonomy. As expected, both autonomy and connectedness positively influence esthetic appreciation: $R^2 = 0.322$; $F(3, 581) = 91.421$, $p < 0.001$; $\beta_{autonomy} = 0.325$, $SE = 0.056\%$, and 95% CI = 0.357, 0.604; $p < 0.01$; $\beta_{connectedness} = 0.261$, $SE = 0.057\%$, and 95% CI = 0.266, 0.507, $p < 0.01$; $\beta_{functionality} = 0.231$, $SE = 0.053\%$, and 95% CI = 0.224, 0.461, $p < 0.01$. Furthermore, as

FIGURE 3 Examples of stapler stimuli used in Study 2 [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 6 Means for each variable in the model for staplers from Study 2

Esthetic pleasure	Connectedness	Autonomy	Functionality
4.14	3.90	3.99	4.76

predicted, autonomy is more important in explaining esthetic appreciation than connectedness. Means and correlations for all variables in the model are displayed in Tables 6 and 7.

5.3 | Discussion

For a third category of products, we were able to replicate that both connectedness and autonomy have a positive effect on esthetic appreciation. In addition, and as expected, we showed that a shift in the preferred balance between connectedness and autonomy takes place according to how socially risky a product category is. We showed that when a product category is less risky (i.e., staplers), autonomy is more important in explaining esthetic appreciation than connectedness, whereas when a product design is more risky (i.e., sunglasses), connectedness explains esthetic appreciation better than autonomy.

The combined results of Studies 1 and 2 are a first indication that the evolutionary perspective on esthetic appreciation for product designs has explanatory value for the esthetic principle "Autonomous, yet Connected." If people feel socially "at risk," they are more inclined to fulfill their need for safety. On a social level, people create a feeling of safety by appreciating product designs that make them feel connected to their type of people. However, if people feel they are safe, they are more motivated to aim for accomplishment. On a social level, people can achieve this accomplishment by embracing products that make them feel autonomous.

To further assess whether the evolutionary needs for safety and accomplishment moderate the shift in optimal balance between connectedness and autonomy for esthetic appreciation of product designs, we conducted two further studies. In these, the intention was to assess whether factors external to the product designs themselves could similarly influence a shift in optimal balance between connectedness and autonomy. More specifically, in Study 3 we assessed whether a personality variable (Regulatory Focus) related to accomplishment-seeking and safety-seeking behavioral intentions moderates the effects of connectedness and autonomy on esthetic appreciation. In Study 4, we actively manipulated the risk/safety of the task to assess whether risky and safe external conditions moderate the influences of connectedness and autonomy.

6 | STUDY 3

Regulatory Focus fit (Higgins, 1997; Higgins & Cornwell, 2016) is experienced when there is a fit between someone's goal and the means by which they approach their goal. Some people are more prevention focused, and their goals thus concentrate on safety and responsibilities. Other people are more promotion focused, and their goals concentrate more on hopes and accomplishments. When the approach to attain the goals fits with the type of goals it is marked by a positive experience, which may then be attributed to the approach itself (Avnet & Higgins, 2003; Higgins, 1997). People (sometimes depending on situations) are either prevention or promotion focused. We argue that when it is someone's goal to attain safety, and a product design makes them feel connected, there is a match in goal and approach, which is then marked by a positive experience that is attributed to the product design and thus leading to positive esthetic appreciation for the product design. Similarly, when it is someone's goal to attain hopes and accomplishments, and a product design makes them feel autonomous, there is a match in goal and approach, which then ultimately leads to positive esthetic appreciation for the product design. We thus hypothesize the following:

H3 For people with a prevention focus, connectedness influences esthetic appreciation more and autonomy influences esthetic appreciation less than for people with a promotion focus.

6.1 | Method

6.1.1 | Participants

A total of 33 undergraduate students participated in this study that consisted of one condition only. After deletion of flat liners, the final analyses were performed with a total of 28 respondents (mean age = 23.04; *SD* = 1.34; 22 males). As each respondent rated nine designs, the nonaggregated data set created a total of 252 data points to use in the analyses (greater than a priori calculation of 146 based on $f^2 = 0.15$, $\alpha = 0.05$, $1\text{-}\beta = 0.95$, IV = 6 G*Power3.1). They received no reward for participation as this posed a learning opportunity for them.

6.1.2 | Stimuli

We chose to use product designs from the product category *sneakers* as they are consumed publicly, but are less conspicuous than sunglasses as they are not directly in someone's face. Nine product

TABLE 7 Bivariate Pearson's correlations between all variables in the model

	Esthetic pleasure	Connectedness	Autonomy	Functionality
Esthetic pleasure	1	–	–	–
Connectedness	0.442**	1	–	–
Autonomy	0.435**	0.420**	1	–
Functionality	0.281**	0.190**	0.238**	1

Note. **$p < 0.01$.

FIGURE 4 Examples of sneaker stimuli used in Study 3 [Color figure can be viewed at wileyonlinelibrary.com]

designs were selected that together represent a broad range of product designs currently found within the market, and thus varied on many design properties (such as color, shape, and materials used; see Figure 4).

6.1.3 | Procedure

First, participants rated product designs on esthetic appreciation with the same items as used in Studies 1 and 2 (Cronbach's $\alpha = 0.949$). All respondents rated all stimuli that were presented to them in random order. The questionnaire was filled in online through NetQuestionnaires. As in Study 2, connectedness (Cronbach's $\alpha = 0.910$) and autonomy (Cronbach's $\alpha = 0.913$) were both measured after an explanation on "their type of people." The items to measure functionality were the same as in Studies 1 and 2 (Cronbach's $\alpha = 0.910$). Finally, participants were asked to fill in a questionnaire measuring chronic Regulatory Focus by Summerville and Roese (2008). Examples of items used were: "Right now, I am focused on achieving positive outcomes," "I frequently think about how I can prevent failures in my life," and "I frequently imagine how I will achieve my hopes and aspirations."

6.2 | Results

A linear mixed model analysis with by-participant crossed random intercepts was fitted on esthetic appreciation as a dependent variable with the independent variables connectedness and autonomy and the covariate functionality, which was compared with a model including regulatory focus (constructed from difference scores) and its interaction terms with connectedness and autonomy. The second regression model showed a significant change in −2LL, $\chi^2(3) = 12.288$; $p < 0.05$. As expected, the results revealed that both connectedness ($\beta = 1.25$) and autonomy ($\beta = 0.211$) positively influence esthetic appreciation for product designs. Moreover, regulatory focus and connectedness showed a significant interaction effect on esthetic appreciation and regulatory focus, but autonomy showed no significant interaction effect on esthetic appreciation (see Table 8). Correlations between all variables are displayed in Table 9.

To probe these interactions further, two separate PROCESS models were run generating bootstrap 95% CIs for 1,000 bootstrap samples with esthetic appreciation as the dependent variable. In the first model, the moderation effect of regulatory focus on the influence of connectedness on esthetic appreciation was probed by generating parameter estimates for connectedness for *−SD*, mean, and *+SD* Regulatory Focus scores, including autonomy and functionality as variables. In the other model, the moderation effect of regulatory focus on the influence of autonomy on esthetic appreciation was tested, including connectedness and functionality as independent variables.

As predicted, as respondents were more promotion focused, the effect of connectedness on esthetic appreciation decreased, whereas the effect of autonomy increased. Analogously, as consumers were more prevention focused, the effect of autonomy on esthetic appreciation decreased, whereas the effect of connectedness increased (see Table 10a). When the interaction of Regulatory Focus with autonomy on esthetic appreciation was probed, the effect of autonomy seemed to have been moderated by Regulatory Focus in the direction as expected. However, this interaction effect showed that only for people who are more accomplishment focused autonomy had a significant effect on esthetic pleasure, whereas autonomy had no significant effect for people that are prevention focused (see Table 10b). This, and the overall low main effect of autonomy, may explain the insignificant interaction of autonomy with Regulatory Focus found in the LMM. All means for the variables are displayed in Table 11.

6.3 | Discussion

We were able to replicate the effects where connectedness and autonomy positively influence esthetic appreciation. Moreover, we

TABLE 8 Summary of linear mixed model analyses for the predictors connectedness, autonomy, covariate functionality, and regulatory focus and its interaction variables from Study 3

Model summary	−2LL(1,9) = 774.075			
Predictors	***F***	***β***	***SE***	**95% CI**
Connectedness	202.928	1.25**	0.088	1.075, 1.420
Autonomy	6.631	0.211*	0.082	0.049, 0.372
Functionality	7.312	0.239**	0.088	0.065, 0.413
Regulatory focus	2.344	−0.125	0.082	−0.292, 0.042
Regulatory Focus × Connectedness	5.698	−0.188*	0.079	−0.344, −0.033
Regulatory Focus × Autonomy	2.487	0.127	0.080	−0.032, 0.285

Note. CI: confidence interval; −2LL: −2 log-likelihood. $p < 0.10$, *$p < 0.05$, **$p < 0.01$.

TABLE 9 Bivariate Pearson's correlations between all variables in the model from Study 3

	Esthetic pleasure	Connectedness	Autonomy	Functionality	Regulatory Focus Difference
Esthetic pleasure	1	–	–	–	–
Connectedness	0.745***	1	–	–	–
Autonomy	−0.033	−0.198	–	–	–
Functionality	0.458**	0.458**	0.238**	–	–
Regulatory focus difference	−0.169**	−0.104	−0.236**	0.009	–

Note. **$p < 0.01$, ***$p < 0.001$.

found that the effects of connectedness and autonomy are moderated by regulatory focus. As predicted, when people are more promotion focused the effect of connectedness on esthetic appreciation decreases, whereas the effect of autonomy on esthetic appreciation increases. Hence, when people generally seek safety they appreciate product designs that nurture the need for connectedness more, but when they are prone to seek accomplishment they appreciate product designs that nurture the need for autonomy more.

We found that autonomy has no significant effect on esthetic appreciation for people who are prevention focused rather than promotion focused. Hence, people with a high prevention focus were more concerned with increasing their connectedness and were not interested in autonomy at all. This aligns with the idea that human evolution has led people to only pursue accomplishment when a certain basic level of safety is present (Bretherton, 1987; Deci & Ryan, 2000; La Guardia et al., 2000; Ryan & La Guardia, 2000). Indeed, Maslow's hierarchy of needs (1943) supposes that people will first aim to achieve love and belongingness before aiming to fulfill higher order needs such as esteem (prestige, status) and self-actualization. Accordingly, it could be the case for prevention focused people that a basic level of safety is not provided by the product category sneakers, perhaps as sneakers may actually be quite socially risky.

To directly test the moderating effects of safety and risk on the relationship of connectedness and autonomy with esthetic appreciation, we chose to experimentally manipulate conditions of safety and risk in our final study.

TABLE 10 Summary of moderation probing for the predictor (a) connectedness and (b) autonomy, with covariate functionality and regulatory focus as moderator from Study 3

	$F(5, 246) = 72.529$***, $R^2 = 0.596$		
Model summary	***β***	***SE***	**95% CI**
(a) Connectedness			
Predictors			
Connectedness	1.358***	0.092	1.177, 1.539
Autonomy	0.222**	0.081	0.062, 0.381
Regulatory focus	−0.110	0.083	−0.274, 0.054
Interaction effect	−0.223**	0.086	−0.392, −0.054
Functionality	0.217	0.089	0.042, 0.392
Conditional effects			
−*SD*	1.484***	0.117	1.253, 1.716
Mean	1.279***	0.086	1.110, 1.449
+*SD*	1.074***	0.116	0.846, 1.302
	$F(5, 246) = 71.287$**, $R^2 = 0.592$		
Model summary	***β***	***SE***	**95% CI**
(b) Autonomy			
Predictors			
Connectedness	1.234***	0.089	1.06, 1.409
Autonomy	0.091	0.091	−0.087, 0.270
Regulatory focus	−0.179*	0.084	−0.345, −0.014
Interaction effect	0.179*	0.087	0.007, 0.351
Functionality	0.257***	0.089	0.082, 0.432
Conditional effects			
−*SD*	0.010	0.122	−0.250, 0.231
Mean	0.155*	0.081	0.044, 0.314
+*SD*	0.319**	0.105	0.112, 0.526

Note. CI: confidence interval; −2LL: −2 log-likelihood. $p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

7 | STUDY 4

In this study, we decided to manipulate the perceived risk of the task to more directly assess whether safety and accomplishment moderate the effects of connectedness and autonomy on esthetic appreciation. We decided to manipulate risk through the cover stories used to explain the research goals to respondents. In the safe condition, we chose to conduct the study under the guise of research, which is perceived as a very low-risk condition (Campbell & Goodstein, 2001): anonymity of participation and participation "for research only" purposes were emphasized in the introduction of the questionnaire. We created a risky condition by simulating a marketing-type of focus group situation in terms of increased uncertainty and consequences (Campbell & Goodstein, 2001; Oglethorpe & Monroe, 1987): participants were told that their ratings of product designs would be shared with other participants; that the product designs would actually be introduced to the market based on their ratings; and that they would have to justify their ratings afterwards. We hypothesize the following:

H4 People in the safe condition will prefer autonomy more and connectedness less than people in the risky condition.

7.1 | Method

7.1.1 | Participants

A total of 200 Dutch participants from a consumer panel participated in this study divided over two conditions. As each respondent rated six designs each, the nonaggregated data set created a total of 1,200

TABLE 11 Means for each variable in the model from Study 3

Esthetic pleasure	Connectedness	Autonomy	Functionality	Regulatory focus difference
3.302	2.90	4.01	4.31	0.35

data points to use in the analyses (greater than a priori calculation of 146 based on $f^2 = 0.15$, $\alpha = 0.05$, 1-$\beta = 0.95$, IV = 6 G*Power3.1). Participants received reward points that could be exchanged for goods in an online shop when enough reward points were saved; a common compensation for participants from this consumer panel (mean age = 32.8; *SD* = 7.9; 101 males).

7.1.2 | Stimuli

We chose to use product designs from the product category *backpacks* as they are considered as publicly consumed as opposed to privately consumed, but seem less socially risky than sunglasses or sneakers. Six product designs were chosen that together represented the broad range of product designs that are currently found within the market and thus varied on many physical design aspects (such as color, shape, materials used; see Figure 5). We selected six stimuli and used two backpacks as practice stimuli as prior postinterviews informed us that people get a better idea in their mind of who "their type of people" are after they have rated two designs. These practice stimuli were rated in exactly the same manner as the stimuli used for analyses, but were not included in analyses.

7.1.3 | Procedure

First, participants rated the backpacks on connectedness (Cronbach's $\alpha = 0.949$) and autonomy (Cronbach's $\alpha = 0.943$) in the same way as in Studies 2 and 3.

Participants were randomly assigned to the risky or the safe condition. In the risky condition, the questionnaire had the appearance of being administered by the fictitious company "Allbags." We created a logo that was visible on each questionnaire page, and the overall colors used throughout the questionnaire were congruent with the brand logo. Furthermore, after having rated the backpacks on connectedness and autonomy, but before rating the esthetic appreciation of the designs, the participants read an introduction. This explained that their product design ratings would be shared with other participants; that the product designs would actually be introduced to the market based on their ratings; and that they would have to justify their ratings afterwards. In the safe condition, the questionnaire contained the university logo and colors, and the anonymity of participation and participation "for research only" purposes were emphasized in the questionnaire instructions. Participants were also told that they would be asked to answer some general questions in essay form after rating the backpacks to keep anticipated workloads the same across conditions. After this instruction, participants were asked to rate the backpacks on esthetic appreciation (Cronbach's $\alpha = 0.971$) and overall functionality (Cronbach's $\alpha = 0.957$) with the same items as used in Studies 1, 2, and 3. Finally, as a manipulation check, participants were asked to rate how socially vulnerable they felt while filling in the questionnaire on a 7-point Likert scale ("While filling in the questionnaire I felt vulnerable"). Respondents all rated the exact same stimuli and had the exact same amount of workload. The stimuli were presented in random order. The questionnaires were filled out online through Qualtrics.

7.2 | Results

7.2.1 | Manipulation check

An independent *t* test showed a marginally significant difference in perceived social risk between the two conditions ($t = 1.541$; $p_{\text{one-tailed}} < 0.063$, $M_{\text{risk}} = 2.19$, $M_{\text{safe}} = 1.89$).

7.2.2 | Hypothesis

A linear mixed model analysis with by-participant crossed random intercepts was fitted on esthetic appreciation as a dependent variable with the independent variables connectedness and autonomy and the covariate functionality. This model was compared with one including risk as the categorical independent variable and its interaction terms with connectedness and autonomy. The second model showed a significant change in −2LL, $\chi^2(3) = 9.659$; $p < 0.05$. As before, the results revealed that both connectedness and autonomy positively influence esthetic appreciation for product designs. Moreover, risk and autonomy showed a significant interaction effect with esthetic appreciation (see Table 12). A PROCESS model (Model 1; Hayes, 2012) was run generating bootstrap 95% CIs for 1,000 bootstrap samples with esthetic appreciation as a dependent variable, generating parameter estimates for autonomy in the risky and safe conditions. As expected, autonomy had a larger effect on esthetic appreciation for people in the safe condition than for people in the risky

FIGURE 5 Examples of backpack [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 12 Summary of linear mixed model analyses for the predictors connectedness, autonomy, covariate functionality, and risk and its interaction variables from Study 4

Model summary	−2LL(1,9) = 3870.059			
Predictors	***F***	***β***	***SE***	**95% CI**
Connectedness	33.217	0.376**	0.065	0.248, 0.504
Autonomy	83.361	0.569**	0.062	0.447, 0.691
Functionality	474.737	0.871**	0.040	0.793, 0.950
Risk	0.285	−0.045	0.084	−0.211, 0.121
Risk × Connectedness	0.117	0.029	0.084	−0.136, 0.194
Risk × Autonomy	7.802	−0.235**	0.084	−0.401, −0.083

Note. CI: confidence interval; −2LL: −2 log-likelihood. **$p < 0.01$.

condition (see Table 13). No significant interaction effect of connectedness with risk on esthetic appreciation was found in the LLM or a separate PROCESS model. All means and correlations are found in Tables 14 and 15.

7.3 | Discussion

Again, we were able to replicate the main effect that connectedness and autonomy positively and jointly influence esthetic appreciation. Moreover, we found that the effect of autonomy is moderated by risk. When people are in the safe condition, autonomy influences esthetic appreciation more than for people who are in the risky condition. However, we found that the risk manipulation did not influence the effect of connectedness on esthetic appreciation. An explanation could be that the level of social safety associated with the product category used as stimuli (backpacks) was already of a sufficient level and thus one was more inclined to compensate the reduced safety through a decrease in appreciation of autonomy rather than an increase in appreciation of connectedness. This aligns with research suggesting that when sufficient safety is provided one will become motivated to seek accomplishment (Bretherton, 1987; Deci & Ryan, 2000; La Guardia et al., 2000; Ryan & La Guardia, 2000). Hence, people choose to reduce autonomy, rather than increase connectedness in the risky condition compared with the safe condition, when sufficient safety is already provided by the product category.

TABLE 13 Summary of moderation analyses for the predictor autonomy, and connectedness and functionality as covariate from Study 4

	$F(5,1194) = 71.287^{**}$, $R^2 = 0.536$		
Model summary	***β***	***SE***	**95% CI**
Predictors			
Connectedness	0.370***	0.045	0.281, 0.458
Autonomy	0.117	0.111	−0.101, 0.335
Risk	0.046	0.071	−0.093, 0.185
Interaction effect	0.203**	0.071	0.064, 0.343
Functionality	0.889***	0.040	0.812, 0.967
Conditional effects			
Risky	0.320**	0.053	0.217, 0.423
Safe	0.534***	0.057	0.412, 0.636

Note. CI: confidence interval. **$p < 0.01$, ***$p < 0.001$.

8 | GENERAL DISCUSSION

We proposed a new esthetic principle "Autonomous, yet Connected" and show that it positively affects esthetic appraisal. Product designs that optimize consumer's ability to both feel connected and autonomous are the most esthetically appreciated. This esthetic principle is unique compared with existing principles in that it relates to processing properties of a product design in relation to an entirely different reference point. For existing esthetic principles, esthetic pleasure is derived from processing design properties within the product design as such or with reference to other product designs, whereas for the esthetic principle "autonomous, yet connected," esthetic pleasure is derived from the degree to which a product potentially meets our social concerns of relatedness and autonomy (e.g., Deci & Ryan, 2000). The consumer psychology literature has acknowledged the importance of product designs as social symbols (Homburg et al., 2015) but hitherto seems to have ignored the relevance of this social dimension of product design for shaping consumers' esthetic experiences. We advanced this literature by adding a social esthetic principle and investigating its operation under different conditions of safety and accomplishment.

The development of this new, social, principle was guided by the evolutionary explanation for esthetic pleasure and the workings of existing esthetic principles. This evolutionary explanation pertains specifically to "maximizing" esthetic principles that hinge on the need to provide a balance in opposite design dimensions that accordingly

TABLE 14 Means for each variable in the model for risk and safe conditions separately from Study 4

Risk level	Esthetic pleasure	Connectedness	Autonomy	Functionality
High	3.86	3.67	4.16	4.26
Low	3.91	3.73	4.18	4.24

TABLE 15 Bivariate Pearson's correlations between all variables in the model from Study 4

	Esthetic pleasure	Connectedness	Autonomy	Functionality
Esthetic pleasure	1	–	–	–
Connectedness	0.546**	1	–	–
Autonomy	0.454**	0.525**	–	–
Functionality	0.638**	0.441**	0.233**	–

Note. $^{**}p < 0.01$.

enable people to fulfill basic evolutionary needs for safety and accomplishment (Berghman & Hekkert, 2017; Lindgaard & Whitfield, 2004). Two social needs that align with these evolutionary needs are the needs for connectedness and autonomy and these, therefore, formed the basis for the new social esthetic principle.

Throughout this study, we managed to replicate the findings that connectedness and autonomy both positively influence esthetic appreciation for product designs. Further, we noticed a shift in the preferred balance between connectedness and autonomy depending on the risk/safety associated with product categories implying that the underlying evolutionary needs for safety and accomplishment do indeed drive the esthetic appreciation for autonomy and connectedness. This is further confirmed by additional findings on differences found between the product categories used in the different studies. For example, in Study 3, we used *sneakers* as stimuli. These products can be considered highly socially risky, and in congruence we found that overall connectedness was much more important in explaining esthetic appreciation than autonomy. On the other hand, in Study 4 we used *backpacks* as stimuli. These stimuli are potentially less socially risky as they tend be less of a fashion item than sneakers and sunglasses. Accordingly, it is no surprise that overall autonomy was more important in explaining esthetic appreciation than connectedness for backpacks. Further to that, in Study 4, we found that risk manipulation did not influence the effect of connectedness on esthetic appreciation, whereas it did influence the effect of autonomy on esthetic appreciation. An explanation could be that the level of social safety associated with the product category used as stimuli (backpacks) was already of a sufficient level which leads consumers choosing to reduce appreciation for autonomy, rather than increase appreciation for connectedness in the risky condition compared with the safe condition. Hence, people choose to reduce autonomy, rather than increase connectedness in the risky condition compared with the safe condition, when sufficient safety is already provided by the product category. This would mean that designers and marketers can employ connectedness in product designs to increase esthetic appreciation for product categories that are highly socially risky, whereas autonomy can be more effectively used to influence esthetic appreciation for product categories that are of low social risk.

In all studies, functionality plays a significant role in contributing to esthetic pleasure. This is not surprising given the importance of functionality in esthetics identified in previous research (Chitturi, Raghunathan, & Mahajan, 2008). Previous research has also shown that attractive things are perceived to work better (Hassenzahl & Monk, 2010; Tractinsky, Katz, & Ikar, 2000). The interaction of functionality, "Autonomous, and Connected," and other principles that may influence esthetic pleasure through the recognition of our concerns could be researched in the future.

In this study, we developed a scale to measure connectedness and autonomy as communicated by product designs. As no such scale was found, we adapted existing items from personality scales such as "need for uniqueness" and "need for belonging" (Leary et al., 2013; Lynn & Harris, 1997a, 1997b; Snyder & Fromkin, 1977) to pertain to product design. This scale has shown to be highly reliable over several samples and product categories. Hence, in future research these scales can be used to investigate the effects of connectedness and autonomy on consumer behavior.

The adoption of the evolutionary psychological explanation for esthetic pleasure helped in developing the social esthetic principle proposed and this study provides further evidence that this theory does explain the workings of our principle. Our various hypotheses were informed by the notion that people are motivated to maximize both the evolutionary needs for safety and accomplishment. When people find themselves in a risky situation they are motivated to increase their safety (Bettman, 1972; Dowling, 1986). However, when a situation feels safe enough, people more easily see an opportunity to explore and accomplish new things. Indeed, it seems that our results indicate that, as underlined by Maslow's hierarchy of needs (1947), sufficient connectedness is a prerequisite for consumers to appreciate a level of autonomy in a product design. In our research, the notions of safety and accomplishment were operationalized in different ways: social risk associated with the product category, regulatory focus fit, and riskiness of the task at hand. We show that people esthetically appreciate different combinations of levels of connectedness and autonomy in congruence with restoring a disturbed balance in safety and accomplishment, thereby supporting the evolutionary explanation for esthetic pleasure. This, however, does not take away the contribution of influential models that have aimed to explain why and how certain other product dimensions (e.g., typicality, unity, and complexity) impact esthetic appreciation such as the arousal model by Berlyne (1971) and processing fluency model by Reber et al. (2004). However, these *only* explain the relationship of one dimension (complexity and typicality) with esthetic pleasure while ignoring the counterforce of a conceptually opposite dimension in esthetic principles such as MAYA, Unity-in-Variety (UiV), and now Autonomous, yet Connected.

We contend that the "Autonomous, yet Connected" principle can operate independently from other maximizing principles such as MAYA and UiV. For example, if someone belongs to a group of

people for whom the social norm is to convey happiness and cheerfulness (e.g., hippies) then a colorful, busy patterned shirt may make someone feel connected. In contrast, many business people will feel connected to other business people at a conference while wearing a monotone black or blue suit. Similarly, for one group novelty can be the norm (e.g., hipsters), whereas for another group typicality may be the norm (e.g., popular teenagers and populist politicians). Hence, the "autonomous, yet connected" principle can be used to increase esthetic appreciation for product designs, even in circumstances where the dimensions of UiV (e.g., variety) or MAYA (e.g., novelty) cannot be substantially varied. For example, if a brand is known for its sleek and unified designs (e.g., Apple) it may wish to have their completely new product (e.g., iPad) be unified as well to provide brand familiarity (Person, Snelders, Karjalainen, & Schoormans, 2007). Strategically, this brand cannot easily use the dimensions of UiV as they will not wish to increase the product design's variety, nor can they employ MAYA as the new product is entirely novel as a product category. Yet, they can use the principle of "Autonomous, yet Connected" if they have knowledge of the social references that their target groups adhere to. Moreover, even when the other principles can be used, the present principle can provide additional strategic value to enhance the product design's esthetic appreciation.

Previous research has mostly focused on processing design features in relation to other features within the design (e.g., symmetry, unity, and variety) or in relation to a consumer's expectations of what a design should look like (e.g., typicality and novelty). Future research could assess how the different levels (perceptual, cognitive, and social) interact in explaining esthetic appreciation for product designs in different situations (see, e.g., Berghman & Hekkert, 2017). Perhaps, for less socially significant product categories (e.g., vacuum cleaners), people attribute more importance to the UiV and MAYA and less to the social role of products in explaining their preferences, whereas for socially significant product categories (e.g., clothes) this may be the other way around.

This study was carried out with product designs that were taken from the existing market and therefore did not include highly innovative products or very new designs. In reality, businesses regularly introduce new product designs to their target groups. Hence, even though this study provides fundamental insights into how the esthetic principle "Autonomous, yet Connected" influences appreciation of products, further research including more innovative designs would provide extra insights into how exactly this knowledge could be applied in marketing strategies. Employing this design principle strategically could increase the likelihood of consumers adopting highly innovative—and thus inherently risky—products.

Summarizing, this study proposed a social esthetic principle "autonomous yet connected" and showed that an optimal combination of (a product's capacity to enhance) connectedness and autonomy leads to high esthetic appreciation for product designs. Future research in consumer psychology and marketing on esthetic appreciation for product designs should no longer ignore these social dimensions.

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