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RESEARCH ARTICLE

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Technology paternalism: Development and validation of a measurement scale

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Abstract

As technologies become smarter, they tend to protect their users, much like parents protect their children. However, caring too much about a user can lead to technology paternalism, a construct that is becoming increasingly relevant with the advent of smart technologies. Nonetheless, very little is known about what technology paternalism is or how it can be measured. The authors applied established procedures from scale development methodology followed by quantitative measurement to present and validate a three-factor scale (limiting, overruling, and welfare). The approach offers first empirical evidence linking technology paternalism to associated concepts, showing that it correlates as expected with established constructs in the literature on technology acceptance. This study contributes to the literature by uncovering a construct of interest to a critical discussion of technology paternalism and by providing a measurement tool that can be used by researchers, policy makers, and managers.

KEYWORDS

paternalism, scale development, smart technologies, technology acceptance, technology paternalism, technology resistance

1 | INTRODUCTION

Smart products are becoming increasingly common due to digitization. These products gather, process, and produce information, and have capabilities that "traditional" products (e.g., regular watches) do not have. For instance, they can act without needing explicit input from the user, adapt to new situations, and interact with the user, other devices, or other stakeholders around them (Raff et al., 2020). While beneficial, functional features alone can't explain consumer behaviors, attitudes, and technology adoption (Chitturi et al., 2008). Although these features enhance efficiency, they may also lead to resistance or reduced acceptance due to perceived loss of control (Rochi, 2023). Examples are the NEST Learning Thermostat[1] or autonomous cabs offered by Cruise.[2] Past research indicates consumer preference for smart technologies due to their superior capabilities (e.g., Davis, 1989, and Porter & Heppelmann, 2014). However, scholars have also shown that these new capabilities can also lead to consumer resistance, for instance, by reducing user well-being (Su et al., 2014), trust (Vimalkumar et al., 2021), comfort and security (Chang & Chen, 2021), or perceived enjoyment (Lee et al., 2019).

[1]The Nest Learning Thermostat is a smart thermostat, which learns your schedule, programs itself, turns down the heat when you're away.
[2]Cruise autonomous taxis, a subsidiary of General Motors, provides self-driving vehicles without the need for a human driver.

In this research, we apply the concept of paternalism to technologies and human–computer interaction: technology paternalism (TP). An everyday example is loudly beeping cars that annoy us if we drive without fastening our seatbelt. This sound may be perceived as a freedom-cutting annoyance, and drivers cannot overrule it without expert knowledge. It is claimed to be in the interest of the driver, as it increases driver safety or welfare (Spiekermann & Pallas, 2006). Thus, TP can be understood as a freedom-cutting action of technology that is promoted as being in users' interests and cannot be easily overridden. We will leave this as the first working definition, referring to a more detailed definition in the corresponding section.

TP is a largely overlooked area in acceptance and resistance research, lacking empirical evidence and primarily existing as anecdotal or conceptual insights. Notably, only a few scholars (Hilty, 2015; Kinder et al., 2008; Rochi, 2023; Spiekermann & Pallas, 2006) have delved into TP in significant detail. Comprehending TP is vital for understanding how consumers perceive technologies designed to protect or care for their users. Smart products, akin to parental behavior, might be seen as "overprotective" or "controlling." Despite its potential importance, TP has only been measured by Schein and Rauschnabel (2023), who used a four-item ad hoc unidimensional scale.

Technology operates based on the rules programmed into it, which raises the question of whether TP depends on those who set the operating rules (algorithms) for these products. In this context, development engineers, companies, or governmental entities may be the first agents of TP that come to mind (Millar, 2015). Nevertheless, this paper does not focus on the question of "Who are the real patrons?" (Spiekermann & Pallas, 2006, p. 12). Rather, it contributes to the body of knowledge by addressing the empirical gap in users' perceptions of TP. We developed a theoretically sound measurement scale for assessing perceived TP in smart products, utilizing both qualitative and quantitative studies. Our approach, guided by established scale development procedures, offers preliminary empirical evidence linking TP to antecedents, associated concepts, and consequences. The next section introduces smart products and TP in detail, and then places TP in the canon of related concepts and theories. Section 3 introduces the research methodology and all five studies in detail. Finally, a general discussion addresses theoretical issues, practical implications, limitations, and avenues for future research.

2 | THEORETICAL BACKGROUND

2.1 | Smart products

Academics use several terms to describe smart products, such as intelligent products (Raff et al., 2020), smart objects (López et al., 2011), and smart technologies (Roy et al., 2018). In our study, we treat terms like intelligent products and smart things equally, defining a smart product as a device capable of learning, anticipating, and acting independently (Raff et al., 2020). We also consider it to have both a physical and a digital part (Pardo et al., 2020). A smart product has to "address usage on its own" (the physical part) (Pardo et al., 2020, p. 207) and connect itself with a larger network (Raff et al., 2020) to interact with other smart products or humans (Monostori et al., 2016). They exhibit proactive behavior through predictive analytics (Raff et al., 2020) and share, augment, and comprehend the contextual information they gather (Kumar et al., 2024; Mitew, 2014). A smart product "does not need human intervention but instead takes over on its own" (Rijsdijk & Hultink, 2003, p. 206) as it is able to learn, act, and independently set goals (De Bellis & Venkataramani Johar, 2020; Rijsdijk et al., 2007) to deliver value to the user. Hence, through their capabilities, smart devices may interact with people as social entities (van Doorn et al., 2017).

2.2 | Technology paternalism

2.2.1 | Defining technology paternalism

Paternalism is a well-known phenomenon in interpersonal or individual–government interactions. In this context, it is defined as "the interference of a state or an individual with another person, against their will, motivated by a claim that the person interfered with will be better off or protected from harm" (Dworkin, 2020, para. 1). From the perspective of a paternalized person, paternalism can be perceived as personally damaging behavior (Farh & Cheng, 2000) and may lead to counterproductive action (Daniels & Jordan, 2019). In a family context, parents often make paternalistic decisions for their children, including choices about food or TV consumption. Despite well-meaning intentions, differing preferences may lead the child to feel paternalized. Paternalism can also occur between economically acting organizations and employees (e.g., in labor control or industrial safety; Kinder et al., 2008) or between large companies and smaller suppliers (e.g., dictating quality control procedures; Aycan, 2006). Paternalism can also appear in interactions with smart products, since "if objects sense what is rightful and what isn't and based on this information limit or castigate peoples' actions, they effectively become paternalistic" (Spiekermann & Pallas, 2006, p. 9).

Wirtz et al. (2018) suggested that users' acceptance of smart technologies can be influenced by social-emotional elements, like the psychological evaluation of the product as a social presence in their lives. Drawing on the work of Spiekermann and Pallas (2006), we define TP as the autonomous action of a technology claimed to be in the user's interest, directly affecting them, perceived as limiting freedom, and not overrulable without sacrificing functionality. Note that other definitions include autonomy as a dimension of TP (e.g., Spiekermann & Pallas, 2006), but we consider "product autonomy" as a prerequisite of TP (Rochi, 2023), since intelligent technologies by definition act autonomously or independently (Raff et al., 2020). In the absence of autonomy, technology can act only on behalf of the user or perform user-initiated actions, which precludes TP.

Potentially paternalistic technologies surround us, understand our context, and can judge what is right or wrong (according to algorithms). Examples can be taken from the interviews conducted in our qualitative Study 1 (introduced in detail in Section 3.1). For instance, interviewee P5 stated that he felt disregarded by autonomously undertaken back-ups "because the decision was just made on its own, without [me] being included, without me wanting a security backup to be made." In this case, the technology initiated a backup without user consent, impacting perceived user competency and freedom. While this service can be disabled, it involves a trade-off (data security). The action aims to benefit the user by ensuring regular data saving, covering the three stated TP dimensions: limiting user freedom, overruling the technology, and the welfare intention behind technology actions. In this section, we draw on existing research to conceptually support each dimension of TP.

Limiting user freedom

Smart products may diminish our autonomy competencies, making us more vulnerable (Formosa, 2021). According to Rochi (2023), TP may cause users to perceive a loss of freedom or a threat to a certain behavior, which leads to an attempt to restore behavioral freedom (e.g., developing product resistance). This phenomenon is also known as reactance (Miron & Brehm, 2006). For example, if an autonomous car slows down against the user's will, they may feel that their autonomy is threatened. If users can reverse the decision and regain freedom, they may do so. In cases where regaining freedom is not possible (e.g., due to required programming knowledge or default settings), this may result in a changed product evaluation, leading to a lower adoption intention or stronger resistance (Rochi, 2023).

Overruling the technology

Smart products have the potential to deliver better performance, customization, and customer value compared to conventional alternative products (Porter & Heppelmann, 2014). Consumers may lose value and functionality when they override the actions of smart products. However, intervention design is crucial for fostering the adoption and use of information technology (Venkatesh, 2022). If the functionality of a smart product cannot be easily changed or turned off (because it requires expert knowledge, e.g., programming skills), this may place the consumer in a paternalistic relationship with the device (Millar, 2015; Sørensen & Schmidt, 2016).

Welfare intentions behind technology actions

Smart products aim to promote user welfare, such as autonomous shopping assistants and recommendation agents that aim to reduce search time and costs. These algorithms aim to ensure users receive a manageable amount of relevant and interesting information. However, they may potentially undermine individual decision-making, deprive users of crucial information, limit the opportunity to expand horizons, and reduce perceived personal freedom of choice, subsequently decreasing usage (Appelgren, 2019; Helbing et al., 2019). The welfare intention dimension is particularly important for the perception of TP. Without welfare intention, an action by a smart product cannot be perceived as paternalistic, and potential threats to freedom or a lack of overruling options may be perceived as simple autonomy cuts. Hence, a key aspect of paternalism is the intention of user welfare in the overruling or freedom-threatening action.

2.2.2 | Antecedents and consequences of technology paternalism

The perception of TP emerges from consumer–smart-technology interaction (Rochi, 2023). As this perception is dependent on user and technology characteristics, we propose technology autonomy as an antecedent of TP. Further, we predict that lower usage intention is a consequence of higher levels of perceived TP. We empirically test these assumptions in Section 3.6.

Antecedent: Technology autonomy

To enhance user experience and adapt to usage scenarios, smart products gather and analyze substantial volumes of personal data and context (Karwatzki et al., 2017). This data collection often takes place covertly or without user consent, causing a sense of compromised autonomy (Yost et al., 2019). In most cases, it is not easy to overrule smart products' autonomous actions (without expert knowledge), which results in a perception of TP (Rochi, 2023). Recent research by Lucia-Palacios and Pérez-López (2021) shows that increasing product autonomy leads to a loss of control, thereby increasing the perception of intrusiveness, which is likely to lead to TP. Thus, we expected a positive correlation between technology autonomy and TP.

Consequence: Usage intention

Limiting customer control may impact the market success of smart products (Zimmermann et al., 2023). High product autonomy can lead to a perception of reduced user control (Schweitzer et al., 2019). Moreover, current limitations of smart technologies in adapting to unusual queries and fully understanding complex user context (Ameen et al., 2021) leave users to decide how to modify processes and respond to changing conditions (Meissner et al., 2021; Schein & Rauschnabel, 2023). However, when users lack adaptation or overruling options, they resort to evasive tactics to bypass the system or avoid undesirable actions (Kinder et al., 2008), which reduces usage intention (Rochi, 2023). According to the technology acceptance model (TAM) and the unified theory of acceptance and use of technology, perceived usefulness (PU), effort expectancy (EE), and performance expectancy (PE) are the main indicators of intention to use a technology (Davis, 1989; Venkatesh et al., 2012). Considering TP as a factor negatively affecting behavioral intention through these constructs (Rochi, 2023), we predicted a negative correlation with PU, EE, and PE.

2.2.3 | Differences and interrelationships with related concepts

To comprehend the significance of TP, it is essential to examine its differences and connections with related concepts (e.g., technology intrusiveness) and theories (e.g., psychological reactance theory or technology acceptance theories). In doing so, the importance of considering TP in marketing and other disciplines is highlighted, as it offers a new perspective on technology adoption research. For instance, according to TAM, external factors (e.g., design features) lead to cognitive responses, including perceived ease of use and PU (Davis, 1989, 1993), which consequently influence users' adoption intentions. Therefore, TP can be seen as such an external factor (e.g., as a combination of design features) influencing those cognitive responses. In contrast, TAM postulates that increasing usefulness and ease of use always leads to a more positive attitude toward a technology. However, this "the more value/service the better" hypothesis might not automatically hold true with all smart products. At a certain point, excessive advice, support, or information can result in lower adoption (Rochi, 2023) (for a detailed discussion of interrelationships and differences between TP and related concepts and theories, see Table 1 in the web appendix). Based on the above considerations, we developed an initial conceptual model (Figure 1).

3 | RESEARCH METHODOLOGY AND DATA ANALYSIS

We conducted an initial qualitative construct specification of TP by analyzing the content of 15 qualitative interviews (Study 1). Based on the results, we generated a set of potential items in Study 2. Study 3 aimed to reduce the list of potential items through expert and consumer validation. In Study 4, we used exploratory factor analysis (EFA) to determine the number of dimensions to retain. Study 5 included a validation study based on a confirmatory factor analysis (CFA) to corroborate the factor solution from Study 4. We provide preliminary evidence on nomological validity with additional data from Studies 4 and 5 in Section 3.6.

3.1 | Study 1: Qualitative construct specification

In Study 1, semi-structured in-depth interviews were conducted to identify the dimensions of perceived TP [$N = 15$; 67% male, aged 22–59 years, $M = 31$ ($SD = 13$) years]. All participants had experience using smart devices. The interviews began with some general questions about smart technology use and ensured a common understanding of smart technologies. To obtain diverse perspectives, we utilized a sample of participants with different genders, professions, technology use, and sociodemographic backgrounds. To define the number of interviews, we applied the concept of theoretical saturation, meaning that data collection continued until further interviews did not generate additional insights (Matthes et al., 2017). After 10–11 interviews, we found that no new information was being drawn from additional interviews (Glaser & Strauss, 2017).

Since the interviews generated text in a free-form manner based on the informants' input, we utilized interpretative techniques for data analysis for construct specification. We included suggestions from thematic analysis for theory building and conducted a coding process using open, axial, and selective coding (Corbin & Strauss, 2015; Boyatzis, 1998; Felix et al., 2017). During the initial phase, open coding was employed to meticulously analyze the data on a line-by-line basis. Through this process, we systematically generated preliminary categories using probing and comparison techniques (Goulding, 2005). In the subsequent stage, axial coding was deployed to reveal overarching second-order themes, elevating the analysis to a more abstract level. This stage involved linking concepts that emerged during the open coding stage through a "compare and contrast" approach (Felix et al., 2017, p. 120). The final step, selective coding, involved merging and solidifying axial codes into higher-level second-order categories. Our analytical framework followed the inductive procedure elucidated by Homburg et al. (2017).

3.1.1 | Interview results

The interviews revealed three second-order dimensions of perceived TP. These dimensions showed strong equivalence with the preliminary definition of TP described above. Restriction of freedom was a major theme that emerged repeatedly. Giving up autonomy to become safer seemed desirable to some study participants, but many indicated that giving up control and letting smart technology decide was not an option. They also stated that they wanted to be informed about the basis for the technology's actions to understand its decisions. Ways to override the technologies and regain control were also mentioned regularly. Respondents expressed that it was important that the autonomous technology actions made sense to them; otherwise, they would prefer to have control. One respondent emphasized that human decision-making should always come before technological decision-making and that humans should always be able to interrupt technological decision-making processes.

In contrast, other respondents indicated that they had great confidence in the decision-making authority of technology. The feeling of being protected versus the loss of autonomy received mixed opinions in the interviews. Therefore, the situation in which a technology makes decisions plays a key role in whether it increases or decreases TP. Table A5 in the appendix summarizes the exemplary statements, interpretations, and dimensions that emerged from the qualitative interviews. Additionally, respondents provided few to no statements on product autonomy playing a key role when perceiving TP. One reason for this could be that all technologies assessed in the interviews were judged autonomous from the outset. This supports our assumption that product autonomy is a prerequisite for TP (see Section 2.2.2.).

3.2 | Study 2: Item generation

After obtaining information from consumers about their perceptions of TP, we developed an item pool by identifying specific interview

TABLE 1 EFA results (Study 4).

Items	Limiting user freedom	Lack of overruling prospects	Welfare intention by technology
The system restricts my freedom.	**0.877**	−0.052	−0.033
The technology overrides my desires.	**0.795**	−0.060	0.135
The technology makes me lose freedom of choice.	**0.783**	0.014	0.071
The technology disregards my wishes.	**0.784**	0.095	−0.080
The technology decides against my will.	**0.777**	0.012	0.018
I feel like I'm externally controlled by the technology.	**0.675**	0.097	−0.089
The technology is authoritarian.	**0.620**	0.179	0.001
The final decision is up to the technology, even if I don't want it to be.	−0.054	**0.854**	0.052
I can't overrule the decisions of technology.	0.030	**0.787**	−0.011
I can't get around the choices of technology.	0.055	**0.733**	−0.008
The technology forces me to accept its decisions.	0.197	**0.650**	−0.007
The technology requires that I submit.	0.255	**0.607**	−0.047
The technology ensures that I follow rules.	0.010	−0.141	**0.780**
The technology ensures that I follow regulations, even if I didn't intend to.	0.194	−0.041	**0.647**
The technology wants the best for me, even if that means overruling me.	−0.057	0.046	**0.613**
To protect me, the technology is allowed to take control, even if it overrides my decisions.	−0.157	0.341	**0.566**
Cronbach's alpha	0.918	0.895	0.766
Lowest corrected item-to-total correlation	0.672	0.722	0.539
Mean	3.11	2.81	3.38
SD	1.35	1.35	1.23
Factor correlations			
Lack of overruling prospects	0.709		
Welfare intention by technology	0.390	0.446	

Note: Method: principal axis analysis, Promax rotation; loadings above 0.5 shown in **bold**.

Abbreviations: EFA, exploratory factor analysis; *SD*, standard deviation.

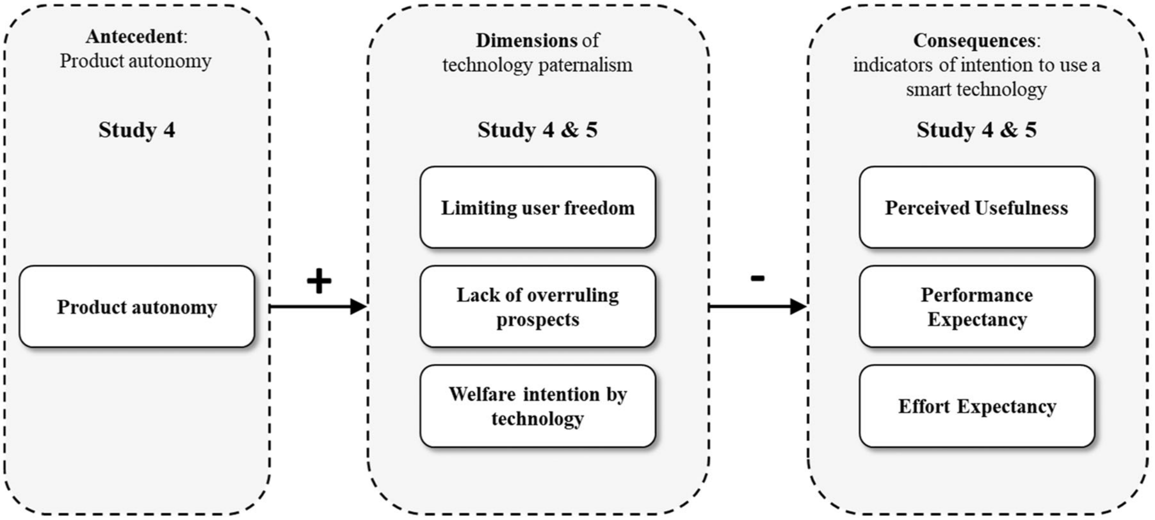

FIGURE 1 First conceptual model of technology paternalism and proposed antecedents and consequences.

statements (i.e., potential items). Our analysis of interview transcripts, conducted by two coders, resulted in the identification of 163 statements, several of which were deemed redundant and removed through discussion, leaving 74 statements. In addition to these statements, we incorporated items from prior journal and conference publications (e.g., Paetzold, 2021; Schein & Rauschnabel, 2023), even though they lacked an established systematic scale development process, to ensure that all possible nuances were covered. The combination of these statements and items resulted in 89 potential items.

3.3 | Study 3: Item revision

To limit the number of potential items for quantitative methods and for content and face validity, we collaborated with experts and consumers to validate all 89 generated items for their fit. Informants were recruited from academia and practice via professional and private social networks and cold calling. Before sending the items for validation, we discussed the context and validation process with each expert separately.

First, we introduced the purpose of the research project. Then, we distributed all statements in random order in a spreadsheet. We asked our informants to rate all 89 items on two criteria: face validity ("To what extent do you think this statement is related to paternalism through technology?") and clarity of expression ("How clear do you think is the wording of this statement?"). Respondents then rated each item on a 7-point Likert scale. For each item, informants could add a comment (e.g., recommendations for improvement). We also asked about missing statements (none were mentioned in the evaluation process). The informants had several days to complete this task, and three experts verbally added their insights and ideas after the process. We excluded low-scoring statements to reduce the item lists. For the final selection of potential items, we considered only those rated as 4 or higher by at least 75% of respondents regarding face validity and clarity of expression. To assess the robustness of the cutoff criteria, we performed replications with different thresholds, which led to comparable results with only minor differences. In the end, we combined both item lists (face validity and clarity of expression) and excluded duplicates, resulting in a final set of 28 items.

3.4 | Study 4: Calibration study

To determine the potential underlying dimensions, we conducted a calibration study based on the 28 remaining items. We identified nine technologies (smart watch, smart phone, smart speaker, smart home systems, smart coffee machine, autocorrect function, autonomous car, smart thermostat, augmented reality [AR] glasses) that could potentially trigger TP by re-analyzing the interview materials and prior publications in the field. A total of 280 respondents (53% male, age: $M = 40$, $SD = 12$ years) were recruited via a professional online access panel in Germany for financial compensation. Since technologies can only be perceived as paternalistic if consumers have some knowledge about them, respondents first rated their knowledge of all nine technologies. Of those technologies rated on the scale midpoint or above, a lottery algorithm randomly chose one as the target technology for the remainder of the survey. This dynamic assignment of technology to each respondent was a key reason for using an online survey. Next, the 28 items were shown with a focus on each respondent's target technology (with an explanation of the technology beforehand). Consumers were asked to rate each item on a 7-point Likert scale. We provided several variables to assess nomological validity and demographic variables.

Following established procedures in the literature (Churchill, 1979; DeVellis, 2017), we applied EFA to the 28 items. A three-factor solution (see Table 1) was deemed most appropriate based on four criteria: eigenvalues were greater than one, a parallel analysis suggested a three-factor solution, a minimum average partial test suggested a three-factor solution (Velicer, 1976), and the interpretation of the factors was possible and plausible. To better understand the factor structure and improve the measurement characteristics, we examined the factor structure using a principal axis analysis with oblique promax rotation. We eliminated items with low factor loadings (< | 0.50 |) and/or problematic cross loadings (> | 0.30 |) as suggested in the literature (Hair et al., 2019). The final solution consisted of 16 items and explained 59.61% of the total item variance.

3.4.1 | Scale inspection

Reliability analyses showed sufficient alpha coefficients above 0.70 (Hair et al., 2019) for each dimension (see Table 1). The resulting factors were consistent with the theoretical definition of TP and the results of Study 1. Therefore, we followed the definition of TP in naming the extracted dimensions: limiting user freedom, lack of overruling prospects, and technology welfare intention. The measure of sampling adequacy was 0.928, exceeding the minimum criterion of 0.50 (H. F. Kaiser, 1974). Bartlett's test for sphericity was significant at the <0.001 level (Hair et al., 2019). To test robustness, replications using different estimators (e.g., maximum likelihood) and rotation methods (e.g., varimax) yielded similar results. A series of replications based on different subsamples (e.g., gender or age) demonstrated robustness.

3.5 | Study 5: Validation study

While Study 4 provides preliminary evidence regarding the factorial structure, the measurement tool had not yet been replicated and validated in a different setting. Thus, in line with recommendations in the literature (Hair et al., 2019), Study 5 aimed to validate the factor structure using CFA and investigate discriminant validity and nomological validity.

In Study 5, we used the same sampling and survey procedure as in the calibration study ($N = 323$; 54% males, age: $M = 42$, $SD = 13$ years). No respondents of Study 4 were part of this data collection. The questionnaire included the TP items identified in Study 4. Furthermore, to assess nomological validity, we included established scales from the literature, namely performance expectancy (the degree to which using a technology will provide utilitarian benefits to consumers in performing certain activities; synonym: PU) and effort expectancy (the degree of ease associated with consumers' use of technology; synonym: ease of use; Venkatesh et al., 2012). Furthermore, we included two theoretically unrelated variables, internal political efficacy and metaverse knowledge, for common method variance (CMV) tests. All items are listed in the appendix (Table A6).

3.5.1 | Fit validity, reliability, convergent and discriminant validity, and robustness

On a global level, the CFA (AMOS, ML estimation) indicated a good model fit ($\chi^2 = 233.733$; $df = 101.00$, $p < 0.001$; $\chi^2/df = 2.314$; comparative fit index = 0.963, Tucker–Lewis index = 0.957, root mean square error of approximation = 0.064 [0.053; 0.075], standardized root mean square residual = 0.058). All factor loadings were significant ($p < 0.001$) and in the proposed direction (Table 2). Composite reliabilities all met the benchmark of 0.70 (Hair et al., 2019). All AVE values were above the threshold of 0.50, reflecting adequate convergent validity (Hair et al., 2019). For discriminant validity, the model met the Fornell-Larcker criterion (Fornell & Larcker, 1981) and the HTMT threshold, confirming the three-factor solution (Henseler et al., 2015). We tested the robustness of the model by performing invariance tests for age and gender, with no variance between groups (Putnick & Bornstein, 2016). Tests for CMV indicated no concerns (details available upon request).

3.6 | Assessment of nomological validity

Nomological validity is given when a construct shows expected associations in a network of related variables (Bagozzi & Yi, 2012). We tested nomological validity by investigating the empirical relationships of TP with a related construct, an antecedent, and consequences (see Sections 2.2.2, 2.2.3, Figure 1 and Table 1 in the web appendix for theoretical motivation). All data used for these nomological tests were gathered in Studies 4 and 5. All items were translated into German. The identified correlational patterns are in line with theoretical assumptions and therefore support nomological validity (see Table 3).

As postulated, product autonomy can be interpreted as an antecedent, as it was positively correlated with all sub-dimensions and TP. We explored the roles of age and gender, two common variables in technology acceptance research. The results indicated that paternalism was uncorrelated with age and gender, suggesting that paternalism can be experienced across groups. This is plausible, yet the underlying mechanisms might differ (e.g., rebellion for younger consumers with stronger needs for autonomy versus older users with more lived experience resulting in more confidence in their own capabilities); testing this remains an avenue for future research (see future research section). An additional t-test for equality of means comparing gender showed similar results, with males and females experiencing equivalent levels of TP. The relationship between TP and technology intrusiveness, where intrusion refers to entrance into the consumer's life without permission (Mani & Chouk, 2017), showed robust correlational evidence, and technology intrusion was found to be a strongly related concept. Scales representing the postulated consequences of TP, namely PU, EE, and PE, showed negative correlational relations to TP. In conclusion, these results indicate nomological validity. Following MacKenzie, & Podsakoff, (2011), our final step was to develop norms (calculating

TABLE 2 CFA results of Studies 4 and 5.

Global model	
χ^2 (*df*)	233.733 (101)
χ^2/df ratio	2.314
TLI	0.957
CFI	0.963
RMSEA (LO90/HI90)	0.064 (0.053; 0.075)
SRMR	0.058
Limiting user freedom	
CR/AVE	0.943/0.703
The system restricts my freedom.	0.841
The technology makes me lose freedom of choice.	0.838
The technology overrides my desires.	0.908
The technology disregards my wishes.	0.855
The technology decides against my will.	0.878
I feel like I'm externally controlled by the technology.	0.780
The technology is authoritarian.	0.761
Lack of overruling prospects	
CR/AVE	0.913/0.678
The final decision is up to the technology, even if I don't want it to be.	0.833
I can't overrule the decisions of technology.	0.827
I can't get around the choices of technology.	0.807
The technology requires that I submit.	0.794
The technology forces me to accept its decisions.	0.857
Welfare intention by technology	
CR/AVE	0.827/0.546
The technology ensures that I follow rules.	0.777
The technology wants the best for me, even if that means overruling me.	0.712
The technology ensures that I follow regulations, even if I didn't intend to.	0.799
To protect me, the technology is allowed to take control, even if it overrides my decisions.	0.659

Note: Estimator: maximum likelihood; all factor loadings are significant (all $p < 0.001$).

Abbreviations: CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; TLI, Tucker–Lewis index.

means and standard deviations) to aid in the interpretation of scores on the scale (see Table A7 in the appendix).

4 | DISCUSSION

Smart products have become an integral aspect of our daily routines, offering undeniable benefits such as heightened efficiency and convenience. While these advantages are pivotal, they alone fall short of fully elucidating consumer behaviors, attitudes, and the adoption of technology (Chitturi et al., 2008). Despite augmenting efficiency, these features may encounter resistance or diminished acceptance (Rochi, 2023). Existing research indicates that consumers favor smart technologies owing to their superior capabilities (e.g., Porter & Heppelmann, 2014). Nevertheless, scholars have demonstrated that these capabilities can provoke resistance, impacting user well-being (e.g., Su et al., 2014 and Vimalkumar et al., 2021). This study delves into the concept of paternalism within human-computer interaction, specifically exploring TP. Through a series of five studies, we identified three fundamental dimensions of TP along with the overarching measurement scale designed to quantify TP. All three subscales and the measurement scale exhibit anticipated correlations within a nomological network that encompasses TP's antecedents, related concepts, and consequences of TP, affirming the scale's reliability. This contributes to both theoretical and practical domains, providing valuable insights into the multifaceted nature of TP.

4.1 | Theoretical contributions

First, previous research on TP has been mostly conceptual in nature (Hilty, 2015; Kinder et al., 2008; Millar, 2015; Spiekermann & Pallas, 2006) or used ad hoc scales (e.g., Schein & Rauschnabel, 2023). Despite highlighting the importance of TP, these studies lack rigorous empirical support. This is not surprising given the lack of systematic scale construction. While scholars have emphasized the impact of product attributes on consumers' adoption (e.g., Li et al., 2023), insufficient attention has been given to the concept of TP. Addressing this gap, our work presents a well-grounded and practical conceptual framework for understanding technology's potential to exert paternalism over users. By using a mixed-methods approach, we contribute to and extend prior marketing research.

Second, our work enhances the evolving field of research that centers on emerging technologies within the marketing domain. Several investigations have indicated the impact of artificial intelligence (e.g., Puntoni et al., 2021) and heightened product autonomy (e.g., Formosa, 2021 and Lucia-Palacios & Pérez-López, 2021) on product adoption. Furthermore, studies have shown that consumer resistance toward product automation tends to arise when opportunities to override functions are limited (Millar, 2015; Sørensen & Schmidt, 2016; Venkatesh, 2022). We add to this stream of research by operationalizing TP comprising three first-order dimensions. This

TABLE 3 Correlational relations among technology paternalism, antecedents, related constructs, and consequences.

Antecedents, related constructs, consequences	Study	Limiting user freedom	Lack of overruling prospects	Welfare intention by technology	Technology paternalism
Antecedents					
Product autonomy (Rijsdijk et al., 2007)	4	0.403***	0.387***	0.464***	0.505***
Age	4	0.070	0.025	−0.043	0.023
Age	5	−0.009	0.005	0.045	0.016
Gender	4	0.061	0.033	−0.010	0.036
Gender	5	0.048	0.043	0.095	0.080
Related constructs					
Technology intrusiveness (Mani & Chouk, 2017)	4	0.703***	0.483***	0.115^{T}	0.537***
Consequences					
Perceived usefulness (adapted from Davis, 1989)	4	−0.234***	−0.151*	0.175**	−0.094
Effort expectancy (Venkatesh et al., 2012)	5	−0.383***	−0.233***	0.002	−0.279***
Performance expectancy (Venkatesh et al., 2012)	5	−0.329***	−0.062	0.149**	−0.118*

Note: Pearson correlations; significance of correlations: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; $^{T}p < 0.10$; gender: 1 = male, 0 = female.

offers a robust 16-item measurement tool for TP, serving researchers in human-computer interaction, management information systems, marketing, and related fields, and enabling the pursuit of consistent research outcomes in the area of smart technology adoption across diverse fields of study. It enables researchers to collect reliable and valid data, which is essential for conducting meaningful empirical studies on TP. This enhances the quality of research in the field and helps build a more robust knowledge base. We echo with Spiekermann and Pallas (2006) that product autonomy is a highly relevant construct in the field of TP. However, while Spiekermann and Pallas (2006) discuss it as a dimension, we conceptualize it as an antecedent, and challenge the assumption "the more support the better" of established theories (like TAM).

Third, we provide empirical evidence for the TP–technology-adoption relationship and broaden the understanding of whether TP affects smart technology acceptance. We have provided preliminary empirical evidence for associations between TP and an antecedent (product autonomy; Rijsdijk et al., 2007), a related construct (product intrusiveness; Mani & Chouk, 2017), and consequences (e.g., EE and PE; Venkatesh et al., 2012). Overall, this emphasizes the relevance of TP in technology research.

4.2 | Managerial implications

Notwithstanding the distinct advantages offered by smart products, this innovative technology appears to possess attributes that could impede its widespread adoption (De Bellis et al., 2023). The advent of smart, interconnected products enables companies to forge novel connections with customers, but also demands fresh approaches to marketing strategies (Porter & Heppelmann, 2014). First, to market smart products successfully, it is necessary to consider perceived TP when developing these products. The study results reveal that TP significantly affects technology adoption and offer important implications that may advance managerial thinking about TP. Our validated measurement scale enables product developers to assess the paternalistic potential of their smart products. For example, finding an equilibrium between providing supportive information and patronizing users with overwhelming information provision is key for future smart product development. This is helpful when developing AI-based measurement tools for TP to determine the optimal degree of information input, autonomy cutting, and potential for overruling actions and creating more adaptive, less paternalistic smart products.

From a governmental perspective, this scale can be supportive in finding the optimal degree of adjustment to rules or laws. It can help establish how strong the perceived degree of TP should be to ensure certain user behavior and increase general safety (e.g., in traffic). This also holds true for rolling out new technologies in companies, such as AR-supported smart glasses in warehousing (Schein & Rauschnabel, 2023) or in the vast area of digitization in healthcare (Renner & Moszeik, 2023). Marketers dealing with intelligent products can utilize these findings to shape their segmentation and positioning strategies. One approach to leveraging our conclusions is to categorize consumers based on their varying levels of TP perception, thereby presenting distinct categories of smart products to these groups.

TABLE 4 Possible future applications and research avenues for the concept of technology paternalism.

Context	Application
Technology focused: How does welfare intention moderate the impact of TP?	Achieving the right balance between transparency and support is crucial for smart product acceptance (Rochi, 2023; Venkatesh, 2022). Inadequate transparency can result in perceived loss of personal control (Botti & Iyengar, 2006), whereas excessive support may lead to information overload (Schein & Rauschnabel, 2023). Additionally, reciprocal communication between the user and the smart product (interactivity) negatively affects perceived intrusiveness (Lucia-Palacios & Pérez-López, 2021). This is also true for smart products, where unsolicited advice can lead consumers to ignore technology recommendations and can trigger boomerang effects (Feng & Magen, 2016). Hence, Rochi (2023) proposed that providing more support initially enhances perceived usefulness, but there is a point where it reaches a peak and starts to decline, creating an inverted U-shaped effect. **This interrelationship between the welfare dimension of TP and the other two dimensions needs further investigation**.
Technology focused: How do smart product characteristics drive TP?	**Adaptability**: Designing interfaces that allow users to regain control when necessary can reduce distrust and helplessness (Brell et al., 2019). Such designs increase perceived self-control (Milchram et al., 2018) and decrease perceived disempowerment (De Bellis & Venkataramani Johar, 2020). **Hence, whether adaptability plays an influencing role in the perception of TP requires further investigation**.
User focused: How do user characteristics drive TP?	**Experience**: Balancing default personalization and user-controlled personalization of smart products relies on considering individual needs, characteristics, and the context of use and usage expertise, which all can affect perceived usefulness or usage intention (Attié & Meyer-Waarden, 2022; Venkatesh, 2022). **Hence, whether user experience (both specific smart product experience and general smart product experience) and task experience influence the perception of TP requires further investigation**. **Emotional and psychological factors**: Recent research endeavors in technology adoption have introduced novel elements, such as user well-being and happiness (Attié & Meyer-Waarden, 2022), trust (Vimalkumar et al., 2021), technology anxiety (Meuter et al., 2003), digitalisation anxiety (Pfaffinger et al., 2021), discomfort and insecurity (Chang & Chen, 2021; Flavián et al., 2022) or risk-aversion (Belanche et al., 2020) as factors influencing adoption behavior. **To understand the effects of TP, it is necessary to understand how these emotional factors (are) influence(d by) the perception of TP. Age**: As our results indicate that TP is uncorrelated with age, suggesting that TP can be experienced across age groups, future research could explore whether the antecedents of TP differ. **It would be informative to understand whether younger consumers tend to feel paternalized if hedonic value decreases, or whether older consumers might have stronger usage routines, meaning a disruption of routines through protective features might trigger TP**.
Situation focused: How do situational characteristics and context drive TP?	**Context**: To further understand how TP arises, it is necessary to investigate under which situations users perceive TP. Hence, certain characteristics of situations and contexts may play a key role, such as the **unusualness, perceived danger, and familiarity** of a situation (Venkatesh, 2022). These aspects are strongly connected to the above-mentioned user-focused aspects. **To understand how TP and context is related, further research is needed. Patronizing entitiy**: It is important to understand whether user awareness about "**the real patrons**" (Spiekermann & Pallas, 2006, p. 12)—that is, that the smart product is not the patronizing entity but the company that introduced the product—affects the perception of TP.

4.3 | Limitations and future research

As with any research, this study has some limitations that suggest avenues for new research opportunities. First, this work is based on self-reported correlational data from a single cultural and national setting. Follow-up studies based on our scale may result in significant contributions to the existing body of knowledge, for instance, by comparing results from different cultural environments. Studies assessing strategies to reduce TP can contribute to users' overall well-being, increasing product acceptance. It would also be beneficial to understand how different combinations of the three dimensions lead to differential behavioral outcomes or degrees of TP. It would be informative to understand how the single dimensions interact (especially whether a high score of welfare intention outplays the other dimensions) and how these dimensions affect TP from an isolated point of view.[3] Furthermore, identifying ways to measure TP based on physiological data and reducing it adaptively may add further knowledge on how TP affects user choices. On this, new technologies, such as specific AR or virtual reality devices, can have

[3] We thank an anonymous reviewer for this valuable suggestion.

built-in sensors to capture such data across usage contexts (Au et al., 2023; Rauschnabel et al., 2022). Moreover, while this manuscript focuses on the perception of TP at the user level, it might be interesting to understand whether users realize that the real patrons behind paternalistic technologies are the developers, marketers, and governmental bodies who develop the underlying algorithms or introduce overarching paternalistic regulations. The integration of TP into established theories and related constructs, such as digitalisation anxiety (Pfaffinger et al., 2021) could lead to important contributions in these fields. To highlight this, we added Table 4 to underline the potential future research avenues in different contexts.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data available upon reasonable request.

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REFERENCES

Ameen, N., Tarhini, A., Reppel, A., & Anand, A. (2021). Customer experiences in the age of artificial intelligence. *Computers in Human Behavior*, *114*, 106548. https://doi.org/10.1016/j.chb.2020.106548

Appelgren, E. (2019). Remaining in control with an illusion of interactivity: The paternalistic side of data journalism. *Journalism Practice*, *13*(8), 956–960. https://doi.org/10.1080/17512786.2019.1642128

Attié, E., & Meyer-Waarden, L. (2022). The acceptance and usage of smart connected objects according to adoption stages: An enhanced technology acceptance model integrating the diffusion of innovation, uses and gratification and privacy calculus theories. *Technological Forecasting and Social Change*, *176*, 121485. https://doi.org/10.1016/j.techfore.2022.121485

Au, S., von der Rauschnabel, P. A., Felix, R., & Hinsch, C. (2023). Context in augmented reality marketing: Does the place of use matter? *Psychology & Marketing*, *40*(11), 2447–2463. https://doi.org/10.1002/mar.21814

Aycan, Z. (2006). Paternalism: Towards conceptual refinement and operationalization. In U. Kim, G. Yang & G. Huang, (Eds.), *Indigenous and cultural psychology: Understanding people in context* (pp. 445–466). Springer.

Bagozzi, R. P., & Yi, Y. (2012). Specification, evaluation, and interpretation of structural equation models. *Journal of the Academy of Marketing Science*, *40*(1), 8–34. https://doi.org/10.1007/s11747-011-0278-x

Belanche, D., Casaló, L. V., & Flavián, C. (2020). Customer's Acceptance of Humanoid Robots in Services: The Moderating Role of Risk Aversion. In Á. Rocha, J. L. Reis, M. K. Peter & Z. Bogdanović, (Eds.), *Smart Innovation, Systems and Technologies. Marketing and Smart Technologies* (Vol. 167, pp. 449–458). Springer Singapore. https://doi.org/10.1007/978-981-15-1564-4_42

de Bellis, E., Johar, G. V., & Poletti, N. (2023). Meaning of manual labor impedes consumer adoption of autonomous products. *Journal of Marketing. Advance Online Publication*, *87*(6), 949–965. https://doi.org/10.1177/00222429231171841

de Bellis, E., & Venkataramani Johar, G. (2020). Autonomous shopping systems: Identifying and overcoming barriers to consumer adoption. *Journal of Retailing*, *96*(1), 74–87. https://doi.org/10.1016/j.jretai.2019.12.004

Botti, S., & Iyengar, S. S. (2006). The dark side of choice: When choice impairs social welfare. *Journal of Public Policy & Marketing*, *25*(1), 24–38. https://doi.org/10.1509/jppm.25.1.24

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. Sage.

Brell, T., Philipsen, R., & Ziefle, M. (2019). Suspicious minds? Users' perceptions of autonomous and connected driving. *Theoretical Issues in Ergonomics Science*, *20*(3), 301–331. https://doi.org/10.1080/1463922X.2018.1485985

Chang, Y. W., & Chen, J. (2021). What motivates customers to shop in smart shops? The impacts of smart technology and technology readiness. *Journal of Retailing and Consumer Services*, *58*, 102325. https://doi.org/10.1016/j.jretconser.2020.102325

Chitturi, R., Raghunathan, R., & Mahajan, V. (2008). Delight by design: The role of hedonic versus utilitarian benefits. *Journal of Marketing*, *72*(3), 48–63. https://doi.org/10.1509/JMKG.72.3.048

Churchill, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, *16*(1), 64–73. https://doi.org/10.1177/002224377901600110

Corbin, J., & Strauss, A. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage.

Daniels, S. R., & Jordan, S. L. (2019). The effect of paternalism on incivility: Exploring incivility climate as an important boundary condition. *Journal of Leadership & Organizational Studies*, *26*(2), 190–203. https://doi.org/10.1177/1548051818795817

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319. https://doi.org/10.2307/249008

Davis, F. D. (1993). User acceptance of information technology: System characteristics, user perceptions and behavioral impacts. *International Journal of Man-Machine Studies*, *38*(3), 475–487. https://doi.org/10.1006/imms.1993.1022

DeVellis, R. F. (2017). *Scale development: Theory and applicationsApplied social research methods series: Vol. 26* (4th ed.). Los Angeles, Calif., London, New Delhi, Singapore, Washington, DC, Melbourne: Sage.

Van Doorn, J., Mende, M., Noble, S. M., Hulland, J., Ostrom, A. L., Grewal, D., & Petersen, J. A. (2017). Domo Arigato Mr. Roboto: Emergence of automated social presence in organizational frontlines and customers' service experiences. *Journal of Service Research*, *20*(1), 43–58. https://doi.org/10.1177/1094670516679272

Dworkin, G. (2020). Paternalism. In E. N. Zalta(Ed.), *The Stanford encyclopedia of philosophy: (fall 2020 edition)*. Retrieved from https://plato.stanford.edu/archives/fall2020/entries/paternalism/

Farh, J.-L., & Cheng, B.-S. (2000). A cultural analysis of paternalistic leadership in chinese organizations, *Management and Organizations in the Chinese Context* (pp. 84–127). Palgrave Macmillan. https://doi.org/10.1057/9780230511590_5

Felix, R., Rauschnabel, P. A., & Hinsch, C. (2017). Elements of strategic social media marketing: A holistic framework. *Journal of Business Research*, *70*, 118–126. https://doi.org/10.1016/j.jbusres.2016.05.001

Feng, B., & Magen, E. (2016). Relationship closeness predicts unsolicited advice giving in supportive interactions. *Journal of Social and Personal Relationships*, *33*(6), 751–767. https://doi.org/10.1177/0265407515592262

Flavián, C., Pérez-Rueda, A., Belanche, D., & Casaló, L. V. (2022). Intention to use analytical artificial intelligence (AI) in services—The effect of technology readiness and awareness. *Journal of Service Management*, *33*(2), 293–320. https://doi.org/10.1108/JOSM-10-2020-0378

Formosa, P. (2021). Robot autonomy vs. human autonomy: Social robots, artificial intelligence (AI), and the nature of autonomy. *Minds and Machines*, *31*(4), 595–616. https://doi.org/10.1007/s11023-021-09579-2

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50. https://doi.org/10.1177/002224378101800104

Glaser, B. G., & Strauss, A. (2017). *Discovery of grounded theory: Strategies for qualitative research* (1st ed.). Taylor and Francis. https://doi.org/10.4324/9780203793206

Goulding, C. (2005). Grounded theory, ethnography and phenomenology. *European Journal of Marketing*, *39*(3/4), 294–308. https://doi.org/10.1108/03090560510581782

Groskurth, K., Nießen, D., Rammstedt, B., & Lechner, C. M. (2021). An English-language adaptation and validation of the political efficacy short scale (PESS. *Measurement Instruments for the Social Sciences*, *3*(1), 1. https://doi.org/10.1186/s42409-020-00018-z

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (Eighth edition). Andover, Hampshire: Cengage.

Helbing, D., Frey, B. S., Gigerenzer, G., Hafen, E., Hagner, M., Hofstetter, Y., & Zwitter, A. (2019). Will democracy survive big data and artificial intelligence? In D. Helbing, (Ed.), *Towards digital enlightenment* (pp. 73–98). Springer International Publishing. https://doi.org/10.1007/978-3-319-90869-4_7

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hilty, L. M. (2015). Ethical issues in ubiquitous computing—Three technology assessment studies revisited. In K. Kinder-Kurlanda & C. Ehrwein Nihan, (Eds.), *Advances in intelligent systems and computing: Vol. 333. Ubiquitous computing in the workplace: What ethical issues? An interdisciplinary perspective* (Vol. 333, pp. 45–60). Springer. https://doi.org/10.1007/978-3-319-13452-9_4

Homburg, C., Jozić, D., & Kuehnl, C. (2017). Customer experience management: Toward implementing an evolving marketing concept. *Journal of the Academy of Marketing Science*, *45*(3), 377–401. https://doi.org/10.1007/s11747-015-0460-7

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1), 31–36. https://doi.org/10.1007/BF02291575

Karwatzki, S., Dytynko, O., Trenz, M., & Veit, D. (2017). Beyond the personalization–privacy paradox: Privacy valuation, transparency features, and service personalization. *Journal of Management Information Systems*, *34*(2), 369–400. https://doi.org/10.1080/07421222.2017.1334467

Kinder, K. E., Ball, L. J., & Busby, J. S. (2008). Ubiquitous technologies, cultural logics and paternalism in industrial workplaces. *Poiesis & Praxis*, *5*(3–4), 265–290. https://doi.org/10.1007/s10202-007-0041-z

Kumar, H., Rauschnabel, P. A., Agarwal, M. N., Singh, R. K., & Srivastava, R. (2024). Towards a theoretical framework for augmented reality marketing: A means-end chain perspective on retailing. *Information & Management*, *61*(2), 103910. https://doi.org/10.1016/j.im.2023.103910

Lee, J., Kim, J., & Choi, J. Y. (2019). The adoption of virtual reality devices: The technology acceptance model integrating enjoyment, social interaction, and strength of the social ties. *Telematics and Informatics*, *39*, 37–48. https://doi.org/10.1016/j.tele.2018.12.006

Li, M., Bai, X., Xing, S., & Wang, X. (2023). How the smart product attributes influence consumer adoption intention. *Frontiers in Psychology*, *14*, 1090200. https://doi.org/10.3389/fpsyg.2023.1090200

López, T. S., Ranasinghe, D. C., Patkai, B., & McFarlane, D. (2011). Taxonomy, technology and applications of smart objects. *Information Systems Frontiers*, *13*(2), 281–300. https://doi.org/10.1007/s10796-009-9218-4

Lucia-Palacios, L., & Pérez-López, R. (2021). Effects of home voice assistants' autonomy on instrusiveness and usefulness: Direct, indirect, and moderating effects of interactivity. *Journal of Interactive Marketing*, *56*, 41–54. https://doi.org/10.1016/j.intmar.2021.03.005

MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, *35*(2), 293–334. https://doi.org/10.2307/23044045

Mani, Z., & Chouk, I. (2017). Drivers of consumers' resistance to smart products. *Journal of Marketing Management*, *33*(1–2), 76–97. https://doi.org/10.1080/0267257X.2016.1245212

Matthes, J., Davis, C. S. & Potter, R. F., (Eds.). (2017). *The international encyclopedia of communication research methods*. Wiley. https://doi.org/10.1002/9781118901731

Meissner, A., Trübswetter, A., Conti-Kufner, A. S., & Schmidtler, J. (2021). Friend or foe? Understanding assembly workers' acceptance of human-robot collaboration. *ACM Transactions on Human-Robot Interaction*, *10*(1), 1–30. https://doi.org/10.1145/3399433

Meuter, M. L., Ostrom, A. L., Bitner, M. J., & Roundtree, R. (2003). The influence of technology anxiety on consumer use and experiences with self-service technologies. *Journal of Business Research*, *56*(11), 899–906. https://doi.org/10.1016/S0148-2963(01)00276-4

Milchram, C., van de Kaa, G., Doorn, N., & Künneke, R. (2018). Moral values as factors for social acceptance of smart grid technologies. *Sustainability*, *10*(8), 2703. https://doi.org/10.3390/su10082703

Millar, J. (2015). Technology as moral proxy: Autonomy and paternalism by design. *IEEE Technology and Society Magazine*, *34*(2), 47–55. https://doi.org/10.1109/MTS.2015.2425612

Miron, A. M., & Brehm, J. W. (2006). Reactance theory—40 years later. *Zeitschrift Für Sozialpsychologie*, *37*(1), 9–18. https://doi.org/10.1024/0044-3514.37.1.9

Mitew, T. (2014). Do objects dream of an internet of things? *The Fibreculture Journal*, *23*, 3–26.

Monostori, L., Kádár, B., Bauernhansl, T., Kondoh, S., Kumara, S., Reinhart, G., Sauer, O., Schuh, G., Sihn, W., & Ueda, K. (2016). Cyber-physical systems in manufacturing. *CIRP Annals*, *65*(2), 621–641. https://doi.org/10.1016/j.cirp.2016.06.005

Paetzold, A. (2021). *Adaptive human machine interfaces in a vehicle cockpit: Indication, impacts and implications* (Dissertation). Technische Universität, Chemnitz. Retrieved from https://nbn-resolving.org/urn:nbn:de:bsz:ch1-qucosa2-742354

Pardo, C., Ivens, B. S., & Pagani, M. (2020). Are products striking back? The rise of smart products in business markets. *Industrial Marketing Management*, *90*, 205–220. https://doi.org/10.1016/j.indmarman.2020.06.011

Pfaffinger, K. F., Reif, J. A. M., Huber, A. K., Eger, V. M., Dengler, M. K., Czakert, J. P., Spieß, E., & Berger, R. (2021). Digitalisation anxiety: development and validation of a new scale. *Discover Mental Health*, *1*(1). https://doi.org/10.1007/s44192-021-00003-w

Porter, M. E., & Heppelmann, J. E. (2014). How smart, connected products are transforming competition. *Harvard Business Review*, *92*(11), 64–88.

Puntoni, S., Reczek, R. W., Giesler, M., & Botti, S. (2021). Consumers and artificial intelligence: An experiential perspective. *Journal of Marketing*, *85*(1), 131–151. https://doi.org/10.1177/0022242920953847

Putnick, D. L., & Bornstein, M. H. (2016). Measurement invariance conventions and reporting: The state of the art and future directions for psychological research. *Developmental Review*, *41*, 71–90. https://doi.org/10.1016/j.dr.2016.06.004

Raff, S., Wentzel, D., & Obwegeser, N. (2020). Smart products: Conceptual review, synthesis, and research directions. *Journal of Product Innovation Management*, *37*(5), 379–404. https://doi.org/10.1111/jpim.12544

Rauschnabel, P. A., Felix, R., Hinsch, C., Shahab, H., & Alt, F. (2022). What is XR? Towards a framework for augmented and virtual reality. *Computers in Human Behavior*, *133*, 107289. https://doi.org/10.1016/j.chb.2022.107289

Renner, K.-H., & Moszeik, E. (2023). Digital Mindsets in der betrieblichen Gesundheitsförderung. In S. Kaiser & B. Ertl (Eds.), *Digitale Mindsets* (pp. 119–132). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-41104-6_7

Rijsdijk, S. A., & Hultink, E. J. (2003). "Honey, have you seen our hamster?" Consumer evaluations of autonomous domestic products. *Journal of Product Innovation Management*, *20*(3), 204–216. https://doi.org/10.1111/1540-5885.2003003

Rijsdijk, S. A., Hultink, E. J., & Diamantopoulos, A. (2007). Product intelligence: Its conceptualization, measurement and impact on consumer satisfaction. *Journal of the Academy of Marketing Science*, *35*(3), 340–356. https://doi.org/10.1007/s11747-007-0040-6

Rochi, M. (2023). Technology paternalism and smart products: Review, synthesis, and research agenda. *Technological Forecasting and Social Change*, *192*, 122557. https://doi.org/10.1016/j.techfore.2023.122557

Roy, S. K., Balaji, M. S., Quazi, A., & Quaddus, M. (2018). Predictors of customer acceptance of and resistance to smart technologies in the retail sector. *Journal of Retailing and Consumer Services*, *42*, 147–160. https://doi.org/10.1016/j.jretconser.2018.02.005

Schein, K., & Rauschnabel, P. A. (2023). Augmented reality in manufacturing: Exploring workers' perceptions of barriers. *IEEE Transactions on Engineering Management*, 70(10), 3344–3357. https://doi.org/10.1109/TEM.2021.3093833

Schweitzer, N., Gollnhofer, J. F., & de Bellis, E. (2019). Consumer perceptions of autonomous shopping systems. Retrieved from https://www.alexandria.unisg.ch/publications/261036

Spiekermann, S., & Pallas, F. (2006). Technology paternalism—Wider implications of ubiquitous computing. *Poiesis & Praxis*, *4*(1), 6–18. https://doi.org/10.1007/s10202-005-0010-3

Su, R., Tay, L., & Diener, E. (2014). The development and validation of the comprehensive inventory of thriving (CIT) and the brief inventory of thriving (BIT). *Applied Psychology: Health and Well-Being*, *6*(3), 251–279. https://doi.org/10.1111/aphw.12027

Sørensen, J. K., & Schmidt, J.-H. (2016). *An algorithmic diversity diet? Questioning assumptions behind a diversity recommendation system for PSM*. Aalborg, DK.

Velicer, W. F. (1976). Determining the number of components from the matrix of partial correlations. *Psychometrika*, *41*, 321–327.

Venkatesh, V. (2022). Adoption and use of AI tools: A research agenda grounded in UTAUT. *Annals of Operations Research*, *308*(1–2), 641–652. https://doi.org/10.1007/s10479-020-03918-9

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, *36*(1), 157. https://doi.org/10.2307/41410412

Vimalkumar, M., Sharma, S. K., Singh, J. B., & Dwivedi, Y. K. (2021). 'Okay google, what about my privacy?': User's privacy perceptions and acceptance of voice based digital assistants. *Computers in Human Behavior*, *120*, 106763. https://doi.org/10.1016/j.chb.2021.106763

Wirtz, J., Patterson, P. G., Kunz, W. H., Gruber, T., Lu, V. N., Paluch, S., & Martins, A. (2018). Brave new world: Service robots in the frontline. *Journal of Service Management*, *29*(5), 907–931. https://doi.org/10.1108/JOSM-04-2018-0119

Yost, A. B., Behrend, T. S., Howardson, G., Badger Darrow, J., & Jensen, J. M. (2019). Reactance to electronic surveillance: A test of antecedents and outcomes. *Journal of Business and Psychology*, *34*(1), 71–86. https://doi.org/10.1007/s10869-018-9532-2

Zimmermann, J., Görgen, J., de Bellis, E., Hofstetter, R., & Puntoni, S. (2023). February 16 Smart product breakthroughs depend on customer control. *MITSloan Management Review*. Retrieved from https://sloanreview.mit.edu/article/smart-product-breakthroughs-depend-on-customer-control/

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX

TABLE A5 Summary of exemplary statements, interpretations, and dimensions of qualitative interview results.

Statement examples	Interpretation
Limiting user freedom	
"I think I am still old enough and I have my own senses to decide what I want to drink, what I want to do, and when I want to drink my coffee and how." Interviewee P2 "If I say I want to get out here now and the car won't let me, then the car is taking me as a prisoner. That is holding a person captive. And that is not okay. No matter what the reasons are." Interviewee P1	Sacrificing decision power to a technology leads to cutting of freedom, resulting in an increase of perceived TP.
"It would bother me more if the car decides to slow down because of drizzle. However, it would also be safer. Accordingly, again, it would be an internal process. How much [speed] is reduced? How much is it costing me in time now? Does it have to be done now? How much is it raining? Quite a lot of factors." Interviewee P4 "Because the decision was just made on its own, without [me] being included, without me wanting a security backup to be made, suddenly, my cloud was full." Interviewee P5 "And that would be nice if the technology immediately said, 'I'll reduce the speed to 130.' That's a difference of two kilometers [compared to the lead when speeding]. Thus, a difference [in terms of a time loss] of 42 seconds." Interviewee P4	The interviewee wanted to be notified about the information that forms the basis for the technology's action, to understand its decision. This is interpreted as the participant perceiving a loss of competence through a lack of understanding of the actions made by the technology, which increases perceived TP. Interviewees expressed concern about the lack of transparency of the decision-making process of the technology and when it acts. Furthermore, the desired density of information when interacting (with a smart autopilot) plays a vital role. This is interpreted as the participant perceiving a loss of competence through a lack of understanding of the actions made by the technology, which increased perceived cuts to freedom.
Lack of overruling prospects	
"However, if the reasons seem incomprehensible to me, I probably want to reject it at that moment." Interviewee P7 "This is probably because in most situations, assuming it is really about something more serious, like life and death, the human being then simply also really considers the seriousness of the situation completely, and also works with feelings, and not simply purely logically like a machine, and therefore I would simply trust the human being more, that he really wants the best for me." Interviewee P13 "I simply believe that the human being is an instance that should never be missing, because sometimes there are decisions to be made that a computer can never make. [...] I didn't really feel safe [when trying autonomous features in a car]. Even with this brake, this automatic brake that's sold in a lot of cars now. I know it very likely works, but I don't trust it completely, and I don't really feel safe with it." Interviewee P13	The interviewees stated that they wanted to be able to overrule the technology in the case of perceiving a cut to their freedom (e.g., through a lack of understanding what the technology is actually doing) or any other liming action by the technology. If actions cannot be interrupted by the user, they may feel overruled by the technology or even feel captive and powerless. This is interpreted as the participant perceiving a lack of personal freedom to move whenever they want. Furthermore, interviewees stressed the role of the person as the final decision maker. Here, the issue of trust in the technology plays a vital role. Participants stated that they believed that humans make better-informed decisions than smart technologies, and they did not trust the technology or just believe that humans have more decision-making competence than smart technologies. Therefore, overruling options for the user must be offered in any situation so they can regain control if necessary. If this is not the case, users perceive a lack of causal agency, which results in TP.
"I think that our technology is already very advanced these days and [the technology] can measure the extent to which this [interrupting or correcting an action made by a human] is necessary or not. That's why I would actually trust the machine when it says, 'Hey, something's wrong.'" Interviewee P3 "I trust the machine, well, I trust the technology to know better than I do right now." Interviewee P3 "If the machine gets more input, i.e., gets more of the external circumstances of the situation, it probably makes more sense to listen to the machine than to the human, but if the human has more experience in the situation anyway, and he also has more of an overview of the situation, I will listen to the human." Interviewee P13	Some interviewees stated that they highly trust in the decision-making competence of the technology. In this case, the need for overruling opportunities is lower, and so is TP.

(Continues)

TABLE A5 (Continued)

Statement examples	Interpretation
Welfare intention of technology	
"It's dangerous if AI becomes so sophisticated that you can't make any more decisions. I'm ambivalent about it, but in this car example [autonomous actions made by autopilot], I don't think it's [losing decision making power] so bad, because I believe that it will simply serve safety at some point." Interviewee P4 "I believe that the more severe the consequence of a wrong decision, the greater the acceptance of this restriction [in autonomy]." Interviewee P5 "I think freedom is a very important good, and it should be restricted only for important reasons, such as directly saving lives or preventing traffic accidents." Interviewee P7	The importance of the situation in which a technology makes decisions played a certain role. The more aware the user is of the welfare function of the technology, the less TP they perceive.

TABLE A6 List of all items used in this manuscript.

Scale	Code	Items (English)	Study	Source
Technology paternalism	auto1	The system restricts my freedom.	EFA Study 4 CFA Study 5	Study 1 Study 2 Study 3
	auto2	The technology makes me lose freedom of choice.		
	auto3	The technology overrides my desires.		
	auto4	The technology disregards my wishes.		
	auto5	The technology decides against my will.		
	auto6	I feel like I'm externally controlled by the technology.		
	auto7	The technology is authoritarian.		
	over1	The final decision is up to the technology, even if I don't want it to be.		
	over2	I can't overrule the decisions of technology.		
	over3	I can't get around the choices of technology.		
	over4	The technology requires that I submit.		
	over5	The technology forces me to accept its decisions.		
	wel1	The technology ensures that I follow rules.		
	wel2	The technology wants the best for me, even if that means overruling me.		
	wel3	The technology ensures that I follow regulations, even if I didn't intend to.		
	wel4	To protect me, the technology is allowed to take control, even if it overrides my decisions.		
Internal political efficacy	po1	I am good at understanding and assessing important policy issues.	MV for CMB assessment	Groskurth et al. (2021)
	pol2	I have the confidence to play an active part in a discussion about political issues.		
Metaverse knowledge	meta1	I know what the term "metaverse" means.	MV for CMB assessment	ad hoc
	meta2	I am well acquainted with the subject of "metaverse."		
	meta3	I know how the metaverse works.		
Product autonomy	pat1	The technology determines itself how it conducts tasks.	NV Study 4	Rijsdijk et al. (2007)
	pat2	The technology takes decisions by itself.		
	pat3	The technology takes the initiative.		
	pat4	The technology does things by itself.		

TABLE A6 (Continued)

Scale	Code	Items (English)	Study	Source
Technology intrusiveness	intr1	The technology is intrusive.	NV Study 4	Mani and Chouk (2017)
	intr2	The technology is irritating.		
	intr3	The technology is indiscreet.		
	intr4	I am not comfortable with the technology.		
	intr5	The technology is disturbing.		
Perceived usefulness	PU1	Technology allows me to complete tasks faster.	NV Study 4	Davis (1989)
	PU2	Technology improves my performance.		
	PU3	Technology increases my effectiveness.		
	PU4	The technology makes various tasks easier for me.		
	PU5	The technology is useful.		
Performance expectancy	PE1	I find the technology useful in my daily life.	NV Study 5	Venkatesh et al. (2012)
	PE2	Using the technology helps me accomplish things more quickly.		
	PE3	Using the technology increases my productivity.		
Effort expectancy	EE1	Learning to use the technology is easy for me.	NV Study 5	Venkatesh et al. (2012)
	EE2	My interaction with the technology is clear and understandable.		
	EE3	I find the technology easy to use.		
	EE4	It is easy for me to become skillful at using the technology.		

Abbreviations: CMB, common method bias; MV, marker variable; NV, nomological validity.

TABLE A7 Studies 4 and 5—Means and standard deviations.

Study 4										
Technologies in lottery		**Auto-nomous car**	**AR glasses**	**Smartphone**	**Smart home systems**	**Auto-correct function**	**Smart coffee mach.**	**Smart therm.**	**Smart speaker**	**Smartwatch**
n		29	20	62	23	42	17	21	25	41
TP (overall)	*M* (*SD*)	4.12 (0.79)	3.08 (1.19)	3.19 (0.97)	3.08 (1.10)	3.01 (1.21)	2.98 (1.19)	2.96 (0.94)	2.86 (0.84)	2.64 (1.01)
Limiting user freedom	*M* (*SD*)	3.69 (1.16)	2.88 (1.50)	3.45 (1.26)	2.99 (1.38)	3.06 (1.62)	2.72 (1.18)	2.86 (1.28)	2.97 (1.37)	2.77 (1.18)
Lack of overruling prospects	*M* (*SD*)	3.88 (1.14)	2.81 (1.29)	3.08 (1.32)	2.56 (1.44)	2.45 (1.34)	2.93 (1.70)	2.66 (1.30)	2.73 (1.00)	2.25 (1.16)
Welfare intention by technology	*M* (*SD*)	4.78 (0.78)	3.56 (1.19)	3.04 (1.17)	3.71 (1.09)	3.51 (1.20)	3.28 (1.33)	3.36 (1.09)	2.88 (1.02)	2.90 (1.09)
Study 5										
Technologies in lottery		**Auto-nomous car**	**AR glasses**	**Smartphone**	**Smart home systems**	**Auto-correct function**	**Smart coffee mach.**	**Smart therm.**	**Smart speaker**	**Smartwatch**
n		25	28	71	36	46	21	28	41	27
TP (overall)	*M* (*SD*)	3.99 (0.88)	3.36 (1.02)	3.14 (1.10)	2.93 (0.97)	2.89 (1.01)	3.31 (1.11)	3.28 (1.00)	3.34 (1.07)	3.06 (1.17)
Limiting user freedom	*M* (*SD*)	3.82 (1.52)	3.38 (1.22)	3.21 (1.56)	2.88 (1.36)	3.08 (1.29)	2.87 (1.53)	3.02 (1.57)	3.40 (1.39)	2.93 (1.54)
Lack of overruling prospects	*M* (*SD*)	3.51 (1.37)	3.11 (1.49)	3.35 (1.60)	2.63 (1.20)	2.30 (1.14)	3.19 (1.50)	2.73 (1.33)	3.18 (1.53)	2.86 (1.63)
Welfare intention by technology	*M* (*SD*)	4.63 (1.18)	3.59 (1.19)	2.85 (1.13)	3.26 (1.11)	3.29 (1.35)	3.87 (1.40)	4.09 (1.14)	3.45 (1.11)	3.40 (1.39)

Note: *M* = mean; mach. = machine; *SD* = standard deviation; therm. = thermostat.