



Review of Online Choice Architecture and Vulnerability

Report - July 2024



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Foreword by the Behavioural Insights Team

Over the past decade the UK has led the world in incorporating a sophisticated and evidence-based model of human behaviour into regulation. Behavioural insights teams in regulatory bodies are running cutting edge research on everything from improving the efficacy of product disclosures to how to present choices on the level of sensitive content we see on online platforms. As a result, we have significantly upgraded our models for identifying and addressing consumer harm arising from behavioural market failures.

However, one area that remains underexplored is how consumers interact, behave and make decisions in online environments. These are the spaces where we spend the majority of our time: shopping, working, socialising, being entertained and informed. In short, digital spaces are where we make a host of consequential decisions every day. They are distinct from 'offline spaces' in that there is the scope for a high degree of curation and personalisation, as well as large scale data collection and active experimentation about how to keep us clicking, scrolling and buying. Much of the knowledge flowing from this experimentation sits with private companies, leading to the potential for misaligned incentives and active exploitation of behavioural biases. And, unfortunately, consumers in vulnerable circumstances are more likely to be harmed in these situations - whether it be from being stuck in online subscription traps or falling victim to pressure selling.

I firmly believe this is a space where we can, and should, do better. This report is a significant step towards understanding the interactions between consumer vulnerability and online choice architecture (OCA) from a theoretical perspective, while setting out a suite of recommendations for building the foundations for evidence-based policy. The findings and recommendations presented here have the potential to shape more effective, inclusive, and ethical digital marketplaces.

Overall, we need to do more to consider vulnerability in the design and regulation of online spaces, ensuring that the benefits of advances in digital technology are accessible to all, while minimising the risks of harm or manipulation. There is a clear role for policymakers, regulators, platform operators, and academics to improve protection for consumers in vulnerable circumstances through further research on how online choice architecture impacts decision-making and well-being. We hope that this report is a first step towards a shared understanding, and progress towards that goal.



Elisabeth Costa
UK Managing Director

Foreword by Citizens Advice

The term Online Choice Architecture (OCA) sounds technical and far removed from peoples' lives, but it's absolutely fundamental to the experiences people have when accessing goods and services online. Design decisions are not neutral and our previous research has shown that poor design has a cost: from people spending money on products they didn't want or need, to unwittingly taking out Buy Now Pay Later products they didn't understand, or finding themselves stuck in subscriptions they didn't mean to take out. These are not edge cases, but widespread issues. Indeed, we've previously found that more than 2 in 5 people say that websites often make it too easy to make the wrong choice or click the wrong button.

We've looked at design in a range of settings, including online shopping, credit, online gambling and subscription markets. In each market we've been struck by the fact that people in vulnerable situations appear to be disproportionately likely to suffer poor outcomes as a result of OCA. For example, we found that people with a mental health condition were more likely to report they had accidentally ended up in a subscription than those without a mental health condition. In other research, we found disabled people were almost twice as likely to report that they had used a Buy Now Pay Later product by accident.

The biggest challenge we face around OCA is that what I have referred to as 'poor design' is actually excellent design from the perspective of getting people to spend, gamble or borrow more. To shift OCA away from harming consumers and towards supporting good consumer outcomes requires regulatory action. To their credit, both government and regulators are alive to this and have started to take actions around OCA in general, but there has been little focus on the impact on vulnerable groups. I hope that this report will start to change that. It offers insights for government, regulators and businesses to think about how vulnerable groups might be disproportionately harmed by poor online design.

There are powerful new regulatory tools like the Digital Markets, Competition and Consumer Act and the FCA's Consumer Duty which set standards both for OCA and for treatment of vulnerable groups. As regulators look to put these new tools to work, it is essential that they don't think of OCA and vulnerability as separate approaches to consumer protection, held by different experts in different teams but look to how these two ways of approaching design can come together. We hope this report will be a springboard ensuring that these new tools can be used effectively to raise standards online and create better outcomes for all.



David Mendes da Costa
Principal Policy Manager, Consumer Policy

Executive summary

Most of us have been harmed in some way by how choices are structured and presented online: for example, if you’ve signed up for a free trial and forgotten to unsubscribe before it ended, meaning you paid for a service you didn’t want. Some consumers, however, find themselves in circumstances where they end up being disproportionately harmed compared to others. Keeping on the example of subscriptions, survey research from Citizens Advice found that, while one in four consumers (26%) reported accidentally signing up for a subscription service, this share rises to almost one in two amongst consumers experiencing mental health issues (46%) and those receiving Universal Credit (46%).¹ Consumers in vulnerable circumstances are, by definition, more likely to experience harm as a result of their circumstances.

This report explores how the way in which online platforms are designed to influence our decisions, known as online choice architecture (OCA), disproportionately impacts outcomes for consumers in vulnerable circumstances. The report, commissioned by Citizens Advice and written by the Behavioural Insights Team (BIT), looks at both the theoretical and empirical basis for understanding the impact of OCA on consumers in vulnerable circumstances. The project aims to both motivate government and regulators to look at OCA and vulnerability together, rather than in isolation, and to build the foundation for evidence-based practice in the area of OCA and vulnerability.

Box 1. What is online choice architecture (OCA)

The Competition and Markets Authority (CMA) defines OCA as “the environment in which users act, including the presentation and placement of choices and the design of interfaces.” This report focuses on 20* OCA practices identified by the CMA across three categories:

Choice structure	Choice information	Choice pressure
<ul style="list-style-type: none"> Defaults Ranking Partitioned Pricing Bundling Choice overload & decoys Sensory manipulation Sludge Dark nudges Forced outcomes 	<ul style="list-style-type: none"> Drip pricing Reference pricing Framing Complex language Information overload 	<ul style="list-style-type: none"> Scarcity & popularity claims Prompts & reminders Messengers Commitment Feedback Personalisation

*Virtual currencies in gaming are excluded from this report

¹ Citizens Advice, Tricks of the trade: how online customer journeys create consumer harm and what to do about it (2022) [online] Available at: <https://www.citizensadvice.org.uk/policy/publications/tricks-of-the-trade-how-online-customer-journeys-create-consumer-harm-and-what-to-do-about-it/>

We found that, while there was a clear theoretical basis for why consumers in vulnerable circumstances may be disproportionately harmed by OCA practices, empirical research on the size, impact, and nature of this harm was scarce. For example, we did not find any studies looking at the disproportionate impact of OCA on people with learning difficulties, and only one that focused on people with disabilities. There were eight OCA practices, including choice overload & decoys and drip pricing (both of which the CMA have identified as almost always used to deceive consumers), for which we did not find any studies that looked at disproportionate impacts for consumers in vulnerable circumstances. The lack of empirical research on how OCA disproportionately impacts consumers in vulnerable circumstances means that, despite having good reasons to expect these practices will have a greater impact on certain consumers in vulnerable circumstances, we have an incomplete understanding of the specific harms caused by different practices, and how this manifests for different circumstances of vulnerability.

As for the theoretical basis, we hypothesised that consumers in vulnerable circumstances were more likely to be affected by contexts that make them more susceptible to OCA practices relying on the behavioural biases of complexity, ease, loss aversion and present bias. The contexts included:

- **Having limited cognitive bandwidth:** when a person's capacity to process and manage information is limited because they have other things on their mind. This has been studied specifically in relation to experiencing a financial shock, and the impact that this has on decision-making.²
- **Being in a hot state:** when a person's decision-making is influenced by strong emotions, which can alter their perceptions of outcomes, as well as the quality and quantity of their ability to process information.³
- **Having difficulties with executive functions:** when a person has issues with the cognitive processes that help us manage, focus, and regulate our thoughts and actions. Executive functions include tasks like working memory, control of our inhibitions, planning, and task-switching. These are tasks that require us to focus our attention and problem solve, often towards a specific goal.⁴
- **Having lower literacy or digital skills:** having lower literacy or digital skills than the average or expected level may affect a person's ability to understand some types of information or follow certain directions.

Table A provides an overview of these relationships and provides examples of how they relate to consumers in vulnerable circumstances.

² In the behavioural science literature, this is known as having a scarcity mindset. (We did not use this terminology given that it might raise confusion with the OCA practice of using scarcity claims). See for example Haushofer, J., & Salicath, D. (2023). The Psychology of Poverty: Where Do We Stand?. *Social Philosophy and Policy*, 40(1), 150-184.

³ See for example Loewenstein, G. (2005). Hot-cold empathy gaps and medical decision making. *Health psychology*, 24(4S), S49.

⁴ See for example Ferguson, H. J., Brunson, V. E., & Bradford, E. E. (2021). The developmental trajectories of executive function from adolescence to old age. *Scientific reports*, 11(1), 1382.

Table A. Relationship between behavioural biases, OCA practices, and vulnerability

Behavioural bias	OCA practices relying on this bias	Relationship to contexts of vulnerability	Example
Complexity: information is difficult or effortful to understand	Partitioned pricing, bundling, choice overload & decoys, complex language,* information overload, sensory manipulation	We expect people who have difficulties with executive functions and lower literacy and digital skills to be particularly susceptible to complexity .	Children are still developing their executive functions such as focus and attention. They're expected to be disproportionately impacted by complex language , such as the 'legalese' used in a privacy notice.
Present bias: tendency to choose immediate gratification (or delayed costs) at the expense of a larger future reward (or immediate costs)	Sludge, dark nudge,* complex language,* prompts & reminders, commitment	We expect people with limited cognitive bandwidth , people who have difficulties with executive functions and people in a hot state to be particularly susceptible to present bias .	People experiencing mental health issues are more likely to experience strong emotions and therefore be making decisions in a hot state ; some may experience difficulties with executive functions like controlling inhibitions. They're expected to be disproportionately impacted by dark nudges , such as one-click to buy buttons.
Ease: the absence of difficulty or effort (often in the form of not having to take action)	Defaults, ranking, dark nudge,* forced outcomes	We expect people with limited cognitive bandwidth , people in a hot state , and people with lower digital skills to be particularly susceptible to ease	People who are grieving a loved one (vulnerable circumstances related to life events) are more likely to be making decisions in a hot state . They're expected to be disproportionately impacted by ranking , such as being less likely to scroll through to a second page of options on a shopping website.
Loss aversion: tendency to prefer to avoid losses than to acquire equivalent gains	Reference pricing, drip pricing, scarcity & popularity claims	We expect people with limited cognitive bandwidth and people who have difficulties with executive functions to be particularly susceptible to loss aversion .	People on low incomes are more likely to experience limited cognitive bandwidth because financial worries take up headspace. They're expected to be disproportionately impacted by scarcity and popularity claims , such as when essential products are advertised as 'only 2 left.'

*OCA practices that appear under more than one behavioural bias

It is reasonable to expect that some OCA practices will disproportionately impact consumers in vulnerable circumstances. **Regulators should therefore consider focusing on the disproportionate impacts on these groups when examining OCA practices.** A focus on vulnerability and OCA is urgent and timely: with the recent passage of the Digital Markets, Competition and Consumers Act (2024), policy-makers, regulators and online retailers will be looking to develop tools and insights both into the harms that OCA practices have on consumers in vulnerable circumstances, as well as into developing guidance, codes of practice and tools for how to design better products and services that allow these consumers to thrive in online marketplaces.

More research on vulnerability and OCA is needed to support the development of evidence-based policy, programmes, products, and services. The findings from this report call attention to the lack of research on the disproportionate impacts of OCA on consumers in vulnerable circumstances. This lack of research means it is difficult to develop the tools, guidance, and recommendations necessary to support consumers in vulnerable circumstances. Research that aims to develop a deeper understanding of the experiences of consumers in vulnerable circumstances will allow for more nuanced and therefore more effective action on OCA. We recommended the following priorities for those commissioning and conducting research in this area:

Fill gaps by conducting research on underrepresented groups

- **Consider collecting data on consumers' experience with mental health issues, where applicable, when commissioning quantitative research on OCA practices, including RCTs.** It is also worth supporting the continued collection of survey data for these consumers, given that simulated online experiments may not fully capture the contexts in which people experiencing mental health issues are most vulnerable to harm from OCA (for example, making decisions while in a hot state).
- **Consider commissioning user experience (qualitative) and survey (quantitative) research to better understand the experiences of consumers with learning difficulties and learning disability.** It may be logistically more difficult to recruit a large enough group of consumers from these populations for statistically robust quantitative research. However, it is still important to build the evidence base on disproportionate harms from OCA, as well as on how to design better online experiences for these consumers.
- **Consider conducting studies that compare outcomes for adults and young people where they face similar OCA.** There are circumstances where both adults and young people face the same OCA (for example, retail websites). The differential impacts of OCA practices on children and young people in these environments was understudied, and should be considered as part of future research agendas.

Continue to conduct quantitative trials and collect data on circumstances of vulnerability

- **Ensure specific subgroup analyses on age, income, and education level are conducted by default when commissioning quantitative research on OCA**

practices, including RCTs. These measures are relatively easy to collect, and consumers in these circumstances are a relatively large proportion of the population, meaning subgroup analyses are feasible to conduct in a statistically robust way.

- **Use online experiments to understand the relationship between the most harmful OCA practices, behavioural biases, and circumstances of vulnerability.** Building empirical evidence which increases our understanding of mechanisms influencing the effectiveness of OCA practices will enhance our ability to develop design principles and techniques that reduce harm and support consumers.
- **Encourage organisations that work with consumers in vulnerable circumstances to collect, label, and publish data on OCA harm.** Ideally, this data would then be published for others to understand and use.
- **Consider commissioning research into behavioural factors that contribute to vulnerability to OCA.** We think research into what behaviours or structural factors are associated with vulnerability to OCA could be an interesting additional perspective for understanding vulnerability to OCA.

Consider building towards industry and market initiatives

- **Identify opportunities for online market or product-specific OCA research where consumers in vulnerable circumstances are likely disproportionately represented.** For example, Citizens Advice has identified Buy Now, Pay Later products as a potential market where people on low incomes may be disproportionately targeted.
- **Continue to measure the prevalence of OCA practices across leading online retailers and services, including instances where they are used in combination.** Further analysis could also allow us to identify which OCA practices are abundant in sectors utilised more frequently by consumers in vulnerable circumstances.
- **Use findings on prevalence and harm to develop a rating system that ranks the best and worst retail platforms for consumers.** Previous research has looked into harmful OCA practices on specific websites and compared these across websites, but to our knowledge there is no standardised rating or ranking system used within the UK. Providing a ranking of the websites on their ease of use and use of deceptive OCA practices, or that calls out specific categories such as ‘age-friendly design’ could help steer consumers towards those that will help them make better and more informed choices.

1. Introduction

The digital revolution has profoundly reshaped the consumer landscape in the UK. Over the past decade, online shopping has witnessed an explosive growth, more than doubling in volume and accounting for nearly a third of all retail sales during the peak of the pandemic era.⁵ Similarly, banking customers use internet and online banking more than traditional in-person banking.⁶ While physical shops and banks have long employed design strategies to capture our attention and boost sales, the online realm has taken this to a new level. Every facet of our digital experience is deliberately designed to influence our behaviour and guide our actions. When coupled with the ability to amass vast amounts of data on our online choices and preferences, this leaves consumers increasingly susceptible to harm and manipulation in the digital marketplace.

Most of us have been harmed in some way by how choices are structured and presented online: you've signed up for a free trial and forgotten to unsubscribe before it ended, meaning you paid for a service you didn't want. You've thought you were getting a deal on a product that was advertised as discounted, only to find that the discounted price is what that product is sold for elsewhere. Or maybe you ended up paying more than you'd planned for accommodation, as the initial price you were shown ballooned when additional fees were added throughout the checkout process.

Some consumers, however, may find themselves in circumstances where they end up being disproportionately harmed by the way digital choices are structured and presented. Someone with learning difficulties may find it particularly hard to choose the right insurance product for themselves when presented with complex terms and seemingly unlimited options. A senior citizen may be more likely to think they have to select 'Accept' when that option is large and in a bright colour. A consumer experiencing mental health issues may feel more pressured by a countdown timer to purchase a product because they are already feeling low and worry they will feel worse if they miss out. Consumers in vulnerable circumstances are by definition more susceptible to harm as a result of their circumstances. For example, survey research from Citizens Advice found that more than one in four consumers (26%) reported accidentally signing up for a subscription service. This share rises to almost one in two amongst consumers with mental health issues (46%) and those receiving Universal Credit (46%).⁷

⁵ Office for National Statistics. (2023). Retail Sales Index: Retail Sales Index internet sales ratios [online] Available at:

<https://www.ons.gov.uk/businessindustryandtrade/retailindustry/timeseries/j4mc/drsi>

⁶ YouGov. (n.d.). How often Brits use mobile banking, bank online, visit their bank in branch. Retrieved May 12, 2024, from

<https://yougov.co.uk/topics/economy/trackers/how-often-brits-use-mobile-banking-ie-accessing-account-through-an-app?period=5yrs>

⁷ Citizens Advice, Tricks of the trade: how online customer journeys create consumer harm and what to do about it (2022) [online] Available at:

<https://www.citizensadvice.org.uk/policy/publications/tricks-of-the-trade-how-online-customer-journeys-create-consumer-harm-and-what-to-do-about-it/>

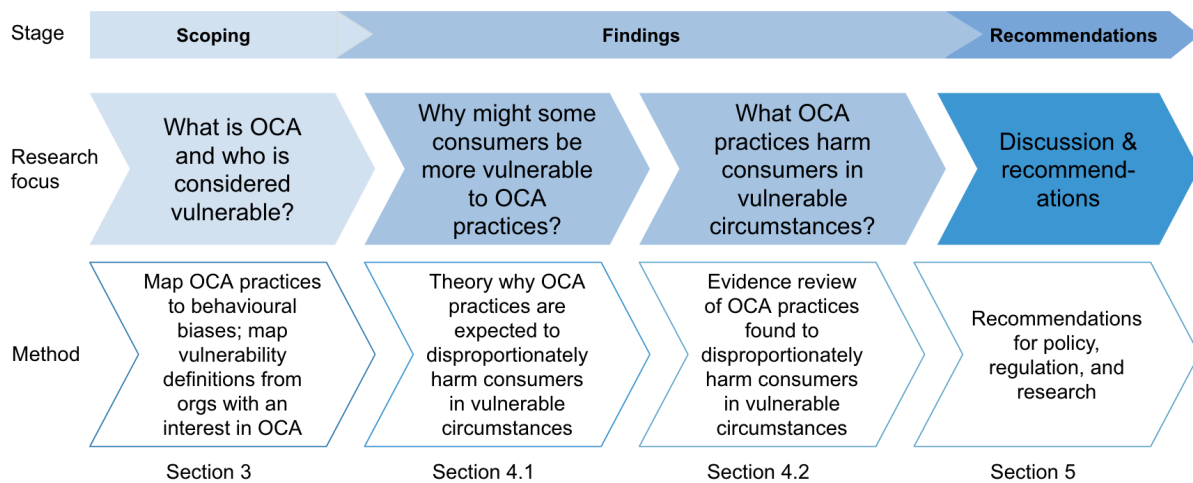
This report explores how the way in which websites and apps are designed to influence our decisions, known as online choice architecture (OCA), disproportionately impacts outcomes for consumers in vulnerable circumstances. The report, commissioned by Citizens Advice and written by the Behavioural Insights Team (BIT), looks at both the theoretical and empirical basis for understanding the impact of OCA on consumers in vulnerable circumstances (see Figure 1). The report builds on key developments in both the application of behavioural science to online decision-making as well as the increasing sophistication with which organisations, policymakers, and regulators in the UK are understanding and responding to the circumstances that can contribute to vulnerability.

The report coincides with significant legislative and regulatory changes that aim to update consumer protection policies for the digital age, with a focus on consumers in vulnerable circumstances. This includes the Financial Conduct Authority's Consumer Duty, which requires financial firms "to deliver good outcomes for all customers, including those with characteristics of vulnerability,"⁸ and the Digital Markets, Competition and Consumers Act of 2024 (DMCC), which updates consumer protection legislation for the digital era and specifically calls out the need to consider consumers in vulnerable circumstances separately from the 'average consumer' when those vulnerable circumstances are 'reasonably foreseeable.'⁹ This project aims to help policymakers and regulators to implement and enforce these new regulatory regimes, with the aim of building the foundation for evidence-based practice in the area of OCA and vulnerability. We hope the findings from the report can be used to shape a programme of research and experimentation to understand the nuances of how OCA practices interact with different circumstances of vulnerability, and what techniques or 'bright patterns' can be used to empower and protect consumers in vulnerable circumstances.

⁸ Financial Conduct Authority. (15/3/2024). Review into firms' treatment of customers in vulnerable circumstances.[online] Available at: <https://www.fca.org.uk/news/news-stories/review-firms-treatment-customers-vulnerable-circumstances#:~:text=Under%20the%20Consumer%20Duty%2C%20firms.by%20the%20end%20of%202024.>

⁹ The DMCC defines 'vulnerable persons' as "a group of consumers [that] is particularly vulnerable to a commercial practice in a way that the trader could reasonably be expected to foresee." *Digital Markets, Competition and Consumers Bill 2024* <https://bills.parliament.uk/bills/3453>

Figure 1. Research focus and methods used



2. Methodology

2.1 Research questions

The evidence review set out to answer the following three research questions:

1. What OCA practices disproportionately harm consumers in vulnerable circumstances?
2. Why are consumers in certain circumstances more vulnerable to OCA practices?
3. What are the gaps in the empirical research on what OCA practices disproportionately harm consumers in vulnerable circumstances?

These research questions highlight the main aims of the research, which include reviewing the evidence on the relationship between OCA practices and vulnerability (RQ1), but also identifying high priority areas for further research (RQ3). To identify these research priorities, we suggested determining which OCA practices are theoretically likely to be associated with vulnerability but have not yet been empirically studied (RQ2).

2.2. Research approach

Our research approach consisted of two stages:

1. Theorising which OCA practices are expected to disproportionately impact consumers in vulnerable circumstances based on key findings from behavioural science; and
2. Examining what OCA practices have been found to disproportionately harm consumers in vulnerable circumstances through an evidence review.

The methods used in each stage are described below.

2.2.1 Theorising which OCA practices are expected to disproportionately impact consumers in vulnerable circumstances based on key findings from behavioural science

Since we anticipated that there would be gaps in the empirical research, we decided to supplement the empirical findings with a theoretical perspective: what OCA practices would we expect to disproportionately impact consumers in vulnerable circumstances based on theory? We used the following methods to set out our theory:

- **Reviewing the behavioural biases that contribute to OCA practices’ effectiveness:** We reviewed the Competition and Markets Authority (CMA)’s Evidence review of Online Choice Architecture and consumer and competition harm (2022) to collate the behavioural biases underlying each OCA practice.¹⁰ This was supplemented by BIT’s expertise and knowledge in this area.
- **Reviewing seminal behavioural science papers to understand why some groups might be more vulnerable to OCA practices:** We reviewed seminal papers in behavioural science that look to explain the contexts under which people might be more susceptible to certain behavioural biases.

We got feedback on this section of the findings in a stakeholder workshop on 21 March 2024 attended by representatives from the CMA, FCA, Ofcom, Ofgem, Lending Standards Bureau, UKRN, Department for Science, Innovation and Technology, and Department for Business and Trade.

To identify which OCA practices we believed were most likely to disproportionately affect consumers in vulnerable circumstances from a theoretical perspective, we first used findings from the CMA Evidence Review of OCA (2022) on vulnerability and BIT researcher’s judgement to identify the behavioural biases that were most likely to disproportionately influence consumers in vulnerable circumstances. Once these behavioural biases were selected, the OCA practices associated with these behavioural biases could be categorised as having a higher likelihood of disproportionately impacting consumers in vulnerable circumstances.

2.2.2 Understanding what OCA practices have been found to disproportionately harm consumers in vulnerable circumstances through an evidence review

To understand what OCA practices have been found to disproportionately harm consumers in vulnerable circumstances, we conducted an evidence review. The evidence review focused on identifying high quality research on whether OCA practices disproportionately harm consumers in vulnerable circumstances (as defined in Table 6) compared to the

¹⁰ CMA, Evidence review of Online Choice Architecture and consumer and competition harm (2022) [online] Available at: <https://www.gov.uk/government/publications/online-choice-architecture-how-digital-design-can-harm-competition-and-consumers/evidence-review-of-online-choice-architecture-and-consumer-and-competition-harm> [Accessed on 26 April 2024]

general population.¹¹ Our approach to the evidence review built on the CMA's Evidence Review on OCA (2022), and incorporated the use of AI tools to assist in identification, assessment, and synthesis. Table 1 shows the number of papers identified, selected for further review, and included in the evidence review. The sections that follow describe the approaches used at each step of the evidence review process.

Table 1. Number of papers identified, selected, and included in evidence review

Source	Identified	Selected for further review	Included in review (assessed as relevant & high quality)
Research on OCA published prior to 2022	599	153	9
Research on OCA published after 2022	1416	193	20

Identifying and selecting research papers to assess

The first step of our evidence review process involved identifying research papers on OCA practices. Once we had identified papers on OCA, we selected papers that were relevant to our research question based on set criteria for further review. We used two different processes for identifying and selecting papers. These processes are outlined in Table 2.

¹¹ Note that we focused on disproportionate harm in our evidence review; we did not explicitly look for research on OCA practices that had been found to disproportionately benefit vulnerable groups.

Table 2. Processes for identifying selecting research papers for further review

	Research on OCA published prior to 2022	Research on OCA published after 2022
Identification	Reviewed and retrieved papers in the bibliography of the CMA's evidence review on OCA	Searched databases and grey literature websites using search terms related to OCA practices and consumers in vulnerable circumstances (see Appendix C)
Selection criteria	<p>Papers were selected for further review based on whether they included:</p> <ul style="list-style-type: none"> • Primary research on OCA and behavioural outcomes • Quantitative impact evaluations or meta-analyses • Large studies using correlational or observational data 	<p>Same as research published prior to 2022 with the following additional criteria:</p> <ul style="list-style-type: none"> • Published after 2022 • Published in English
Cross-referencing	N/A	<p>Cross-referenced sources identified through manual search using:</p> <ul style="list-style-type: none"> • Elicit AI tool; • Google search; • Bibliographies of highly relevant papers.

Assessing research for relevance and quality

Once a paper had been selected for further review, researchers assessed the paper for relevance to our research question and evidence strength. Specifically, researchers were assessing papers against the following criteria:

- **Which specific OCA practices does the paper refer to?** Our evidence review focused on 20 OCA practices identified in the CMA's Evidence Review of OCA (2022) (see Box 1). This criteria aimed to identify which OCA practices were studied in the paper and confirm that it was one of the 20 in scope for our review.
- **Does the paper refer to at least one subgroup?** Our evidence review aimed to examine disproportionate impact on consumers in vulnerable circumstances. This meant that, to be relevant to our research question, research would need to report findings on at least one subgroup compared to the general population. We also included papers that focused on a specific vulnerable group, for example research focused on children.¹²

¹² When we identified a paper which included or focused on a subgroup outside of our list (for example, a paper focused on ethnicity and OCA), we also included the paper for further review.

- **Evidence quality score.** We provided an evidence quality score of 1-5 based on Nesta's standards of evidence ranking. Our interpretation of evidence scores to study types is included in Table 3.

Table 3. Interpretation of Nesta standards of evidence used in evidence review

Nesta standards of evidence level	Interpretation for evidence review
5 - You have manuals, systems and procedures to ensure consistent replication and positive impact	Meta-analysis which includes studies with control groups
4 - You have one + independent replication evaluations that confirms these conclusions	Field randomised controlled trial or field quasi experimental design with a control group
3 - You can demonstrate causality using a control or comparison group	Online randomised controlled trial or online quasi experimental design with a control group
2 - You capture data that shows positive change, but you cannot confirm you caused this	Observational evidence / correlational study / meta-analysis excluding studies with control groups
1 - You can describe what you do and why it matters, logically, coherently and convincingly	Theoretical paper*

*Theoretical papers were not selected for further review, so we did not have any papers with an evidence score of 1.

In addition to assessing papers for relevance and quality, researchers also recorded a number of other factors about the research in a coding framework, which included research aims, summary of intervention, sample size, and findings. If applicable, the researcher recorded the size and direction of any disproportionate effects on consumers in vulnerable circumstances. This information was added to a coding framework which included papers as rows and specific inputs as columns.

Researchers used Claude AI to assist in assessing papers against criteria and in other coding. Further details on the approach and prompt used is included in [Appendix C](#). Researchers incorporated quality checks of Claude's responses, including manually checking the identification of subgroups and the assessment of evidence quality for each paper.

Summarising and synthesising the evidence

The final phase involved summarising and synthesising the findings from the evidence review. Researchers used Claude AI to create an initial categorisation of the findings (see [Appendix C](#) for prompt). Following this initial categorisation, the researchers manually supplemented Claude's categorisation to ensure accuracy and completeness. The researchers then performed a detailed thematic analysis on this data to identify trends and patterns across OCA practices and consumers in vulnerable circumstances.

3. Scoping: OCA and vulnerability

3.1 What are OCA practices and what makes them effective?

The CMA defines OCA as “the environment in which users act, including the presentation and placement of choices and the design of interfaces.”¹³ This report focuses on 20 OCA practices identified and defined by the CMA in their comprehensive *Evidence Review of Online Choice Architecture and Consumer and Competition Harm* (2022) across three categories:¹⁴

- Choice structure: how online choices are structured
- Choice information: what and how information is presented online
- Choice pressure: any additional pressure added to an online choice

Definitions and examples of these OCA practices are included in Table 4.

In its *Evidence Review* (2022), the CMA identified that OCA practices in the ‘choice structure’ category were most effective at influencing our behaviour. The CMA also identified that some OCA practices are almost always used to deceive consumers. These more deceptive practices are flagged in Table 4.

¹³ CMA, Evidence review of Online Choice Architecture and consumer and competition harm (2022) [online] Available at: <https://www.gov.uk/government/publications/online-choice-architecture-how-digital-design-can-harm-competition-and-consumers/evidence-review-of-online-choice-architecture-and-consumer-and-competition-harm> [Accessed on 26 April 2024]

¹⁴ Virtual currencies in gaming were excluded from this report. This was because it is specific to gaming, while the other 20 OCA practices were expected to be relevant across a wide range of industries and sectors.

Table 4: Definitions and examples of OCA practices¹⁵

OCA Practice	Definition	Example
Choice Structure		
Defaults	The choice architect applies a predefined setting that the consumer must take active steps to change	When signing up for a new online service, the default option for email notifications is often set to "receive promotional emails." Consumers must actively untick this option if they prefer not to receive these emails.
Ranking	The choice architect displays the order of options in a particular way.	A consumer looking to buy a pair of headphones online goes onto a retail website or app and types 'headphones' in the search. The headphones that are available to buy will then appear in a list. The retailer can choose to list headphones in order of popularity, review scores, how much money they make as a retailer (e.g. margins), or a combination of these. They can also sell top ranking spots to headphone brands selling through their website.
Partitioned pricing	The choice architect presents individual price components without sharing the total or estimated total costs with the consumer.	On a travel booking website, the base fare for a flight is displayed prominently, but additional fees for baggage, seat selection, and taxes are shown as separate, additional fees.
Bundling	The choice architect groups 2 or more products and/or services in a single "package" at a special price	An online streaming platform offers a subscription plan that bundles together access to movies, TV shows, and music streaming services at a lower combined price than if each service were purchased separately.
Choice overload**	The choice architect provides too many options to compare.	An online electronics retailer offers hundreds of different models of laptops, each with varying specifications and prices, making it challenging for consumers to compare and choose the best option.
Choice decoys**	The choice architect adds an option to the choice set to make the other option(s) look more attractive to the consumer	A meal delivery service lists a "Super Deluxe" package alongside its regular and large options, which includes additional side dishes and desserts. This makes the regular package appear more reasonably priced and encourages consumers to choose it.
Sensory manipulation**	The choice architect employs visual, aural and tactile features to steer consumers towards certain options	When a consumer is browsing a website, a pop-up box appears prompting them

¹⁵ Definitions and some examples taken from CMA, Evidence review of Online Choice Architecture and consumer and competition harm (2022) [online] Available at: <https://www.gov.uk/government/publications/online-choice-architecture-how-digital-design-can-harm-competition-and-consumers/evidence-review-of-online-choice-architecture-and-consumer-and-competition-harm> [Accessed on 18 June 2024]

		to choose between editing their permission settings for the collection and use of their personal data or accepting the default settings, which grant full permission. The 'Accept All' button is bold and bright green, making it highly noticeable and enticing, while the 'Edit Settings' option is less prominent, displayed in subdued grey text and background.
Sludge**	The choice architect creates excessive or unjustified friction that makes it difficult for consumers to get what they want or to do as they wish	An online subscription service makes it overly complicated to cancel a subscription, requiring consumers to click through multiple pages, enter personal information again, and speak with a customer service representative before successfully cancelling the service.
Dark nudges**	The choice architect makes it easy or removes friction for consumers to make inadvertent or ill-considered decisions, e.g. subscription traps	An online streaming service offers a free trial for one month, requiring users to enter their credit card information to sign up. The process to sign up for the free trial is quick and simple, with minimal information required. Once the trial period ends, the subscription automatically renews, and the user is charged without any reminder or warning. The terms of the automatic renewal are buried in the fine print, making them easy to overlook.
Forced outcomes**	The choice architect changes the outcome without giving consumers a choice	After a consumer fills out a survey on a retail website, they are automatically subscribed to the company's newsletter without being given the option to opt-out during the survey process.
Choice information		
Drip pricing**	The choice architect initially shows only part of the price and reveals the full price of the product or service at later stages of the consumer journey	A concert ticket website shows an initial ticket price, but as the consumer progresses through the checkout process, additional fees for handling, convenience, and taxes are gradually revealed, significantly increasing the final cost.
Reference pricing	The choice architect displays a previous (or future) price alongside the current price to make the current price look more attractive	An online clothing store displays a dress with a crossed-out original price of \$100 next to the current price of \$50, making the current price seem like a significant bargain.
Framing	The choice architect decides how decision-relevant information is described or presented to a consumer	A health insurance website presents two plans: one described as having "90% coverage" and another as having "10% co-pay." Despite both offering the same level of coverage, the framing can influence the consumer's perception and choice.
Complex language**	The choice architect makes information difficult to understand by using obscure words and/or sentence	A financial services website uses legal jargon and complex sentence structures in its terms and conditions, making it difficult for consumers to understand the

	structure	true cost and implications of the service they are signing up for.
Information overload**	The choice architect gives a consumer too much information about a product or service such that information about the most relevant attributes is difficult to find and assess	An electronics retailer provides extensive technical specifications for each product, overwhelming the consumer with so much information that it's hard to identify the most relevant features to make an informed decision.
Choice pressure		
Scarcity and popularity claims	The choice architect informs consumers about limited stock, limited time to buy or high popularity of an item	An online hotel booking site shows messages like "Only 2 rooms left!" or "10 people are looking at this hotel right now," creating a sense of urgency that can pressure consumers into making a quick decision.
Prompts and reminders	The choice architect contacts the consumer to induce an action and/or follow up on a previous interaction	An e-commerce website sends emails reminding consumers of items left in their shopping cart, encouraging them to complete their purchase.
Messengers	The choice architect provides a platform on which a specific person or group can communicate with consumers	A fitness app features articles and tips from well-known fitness experts and influencers, leveraging their credibility to influence users' health and fitness decisions.
Commitment	The choice architect facilitates commitment by consumers to a particular behaviour in the future	When making class bookings on a fitness app or website, the customer is made aware that late cancellations and no-shows will incur a fine. This encourages the customer to attend their pre-booked sessions.
Feedback	The choice architect provides consumers with feedback	A customer is shopping online. After adding the item they were looking for to their basket, a pop-up informs them that 90% of the customers who purchased this item also purchased two other complementary products.
Personalisation	The choice architect uses data to personalise offers	An online bookstore uses past purchase history and browsing data to recommend books that align with the consumer's interests and are therefore more likely to be purchased.

** Indicates that this practice is almost always used to deceive consumers, according to the CMA's *Evidence Review* (2022).

OCA practices are used to influence consumer decisions and behaviour. For example, with the OCA practice of ranking, the order in which products appear on a retail platform influences the product a consumer buys.¹⁶ To influence our decisions, OCA practices are designed to leverage underlying patterns in our decision-making, known as behavioural biases. Different OCA practices rely on different behavioural biases to influence our decisions. For example, ranking relies on our tendency to go with the easiest option (ease), our tendency to focus on noteworthy information (salience), and our perception that items at the top of a list are recommended (endorsement). Table 5 defines the main behavioural biases that OCA practices use to influence behaviour, provides a list of the OCA practices that rely on each behavioural bias, and gives an example of how this may look in practice.

¹⁶Behavioural Insights Team. (2024) *Testing the impact of algorithmic rankings on consumer choice* (DSIT research paper no 2024/006) Department for Science, Innovation and Technology <https://www.gov.uk/government/publications/testing-the-impact-of-algorithmic-rankings-on-consumer-choice>

Table 5. Main behavioural biases that OCA practices rely on to influence behaviour¹⁷

Behavioural bias	OCA practices relying on this behavioural bias	Example
Salience: tendency to focus on more noteworthy information while ignoring other information	Ranking, partitioned pricing, sensory manipulation, drip pricing, reference pricing, framing, information overload, prompts & reminders, personalisation	Personalisation (e.g. a list of products with the message ‘we think you might also like [these other products]’) can make an offer more salient and may make it more likely that the consumer purchases additional products.
Arousing emotions: when a process or piece of information results in an emotional reaction	Sludge, dark nudge, complex language, information overload, scarcity & popularity claims, commitments	Information overload (e.g. when terms and conditions are dozens of pages long with complex legal text) often results in the consumer feeling overwhelmed (arousing emotions) and therefore likely to give up, not reviewing all the information provided.
Complexity: information is difficult or effortful to understand	Partitioned pricing, bundling, choice overload & decoys, complex language, information overload, sensory manipulation	Partitioned pricing (e.g. listing a ticket price separate to mandatory fees such as taxes) adds complexity as it relies on the consumer doing their own calculations to total the amount themselves.
Present bias: tendency to choose immediate gratification (or delayed costs) at the expense of a larger future reward (or immediate costs)	Sludge, dark nudge, complex language, prompts & reminders, commitment	Sludge (e.g. having to click through several pages to find the [long] form to apply for compensation after a train was cancelled) adds extra effort to complete a task in the moment. When a consumer places more weight on immediate outcomes at the expense of future rewards (present bias), sludge may make them more likely to give up.
Social influence: changing behaviour to meet the (perceived) demands of a wider group	Scarcity & popularity claims, prompts & reminders, messengers, commitment, feedback	A messenger (e.g. a former footballer endorsing a gambling website) may increase a product’s attractiveness, acting as a social influence that encourages consumers who look up to or relate to the messenger to buy the product or service.
Ease: the absence of difficulty or effort (often in the form of not having to take action)	Defaults, ranking, dark nudge, forced outcomes	Defaults (e.g. asking consumers to untick a box if they do not want to receive marketing emails, meaning if they do nothing they will receive marketing emails) make it easy to go with the pre-selected option: it is what happens if you do

¹⁷ The definitions and mapping of behavioural biases to OCA practices have been adapted from the CMA *Evidence Review* (2022).

		nothing, which is a zero effort action.
Loss aversion: tendency to prefer to avoid losses than to acquire equivalent gains	Reference pricing, drip pricing, scarcity & popularity claims	Scarcity claims (e.g. 'only 2 left') communicates to a consumer that, if they do not buy an item now, they may miss out on the opportunity to buy it. This taps into loss aversion which is our tendency to prefer avoiding a loss (e.g. not having the chance to buy the item) over an equivalent gain (e.g. keeping the money we would have spent on the item).
Anchoring: tendency to rely on initial value presented when making decisions, even if that information is irrelevant	Partitioned pricing, bundling, drip pricing, reference pricing	Reference pricing , by presenting a previously high price next to the presently discounted price, helps to anchor the consumer to a higher price, making the current price seem like a better deal.
Endorsement: tendency to be influenced by the opinions and judgments of authority figures, including choice architects	Defaults, ranking, messengers	A consumer often assumes that top ranking items (e.g. the first items that appear in the search results on a website or app) are the ones the choice architect recommends or endorses .
Friction costs: seemingly small details that make a task more effortful (e.g. a mouse click)	Sludge, forced outcomes	Sludge (e.g. having to click through several pages to find the [long] form to apply for compensation after a train was cancelled) adds friction costs . Even small frictions can have a disproportionate impact on behaviour, as people give up on a process they would otherwise benefit from (such as being awarded financial compensation for a delay).
Endowment: tendency to value an item more highly if owned than if they did not own it (e.g. demanding a higher price to give something up compared to paying for it new).	Defaults, drip pricing	A consumer buying a concert ticket might select a more expensive ticket with a better view. As they progress through the checkout, several additional fees are added to the ticket price (drip pricing). Had they known what the total ticket price would be, they may have selected a cheaper ticket. However, having already imagined themselves with this better view at the concert- the endowment effect - makes them less likely to give up the higher priced ticket at this later stage.

3.2 Who is considered vulnerable?

The starting point for this evidence review came from Citizens Advice's research on OCA and vulnerability, which found that people with mental health issues and people receiving Universal Credit were more likely to report disproportionate harm from some OCA practices: specifically, they were almost twice as likely to report having accidentally signed up for a subscription they didn't want - known as a 'subscription trap' and part of the set of OCA practices known as dark nudges (see Table 4).¹⁸

In addition to Citizens Advice's research, we wanted the scope of our evidence review to include people who are considered vulnerable from a regulatory and legislative perspective. (We refer to these people as 'consumers in vulnerable circumstances' in this report.) We reviewed several definitions of vulnerability from key regulatory agencies with an interest in OCA. Note that these were the organisations' overall definitions of vulnerability, and were not specific to OCA. We also reviewed the definition of vulnerability included in the DMCC, as well as the list of protected characteristics in the Equality Act 2010 (EA), for reference. The output from this review is included in Table 6.

¹⁸ Citizens Advice, Tricks of the trade: how online customer journeys create consumer harm and what to do about it (2022) [online] Available at: <https://www.citizensadvice.org.uk/policy/publications/tricks-of-the-trade-how-online-customer-journeys-create-consumer-harm-and-what-to-do-about-it/>

Table 6. Mapping of circumstances mentioned as contributing to vulnerability

Circumstances contributing to vulnerability	FCA	CMA	Ofcom	ICO	EA	DMCC ¹⁹
Physical health or disability: Physical impairment that has a 'substantial' and 'long-term' negative effect on your ability to do normal daily activities	X		X	X	X	X
Mental health issues: Experience of conditions or disorders that mean you are unable to think, feel, or react in ways you need and want to live your life	X	X	X		X	X
Life events: Events such as bereavement, job loss or relationship breakdown	X	X	X			X
Age: Often refers to older people (65+) or younger people (under 18)		X	X	X		X
Income or financial resilience: Someone who has a low income or a low ability to recover quickly from income & expenditure shocks	X	X				X
Education and capabilities: Level of education attainment and level of digital skills, literacy skills or financial literacy	X	X	X			
Learning disability: Reduced intellectual ability and difficulty with everyday activities				X	X	
Timely moments: Routine periods when consumers may be more susceptible to OCA, including for example scrolling late at night or on a specific day of the week		X				X
Emotional resilience: Low ability to withstand emotional shocks	X					
Learning difficulty: Problems processing certain forms of information ²⁰					X	
Credulity: Propensity to more readily believe specific claims						X

See [Appendix B](#) for further details on these definitions.

¹⁹ The DMCC references 'circumstances [the consumer] is in,' which we have mapped to include life events, financial resilience, and timely moments.

²⁰ Learning difficulties were added following a stakeholder consultation workshop (see [section 2.2.21](#))

It is interesting to note that, while there are similarities across the definitions, there are also key differences in who is considered to be in a vulnerable circumstance. Strikingly, no single circumstance contributing to vulnerability is universally recognised by all regulators and legislation, which indicates the emerging nature of the regulatory response to consumers in vulnerable circumstances as well as the complexity of this topic. To ensure the findings from this report were relevant across the regulatory spectrum, we have included all of these circumstances of vulnerability in this report.

4. Findings

4.1 Why might some consumers be more vulnerable to harm from OCA practices?

OCA practices are widely used because they have been found to impact the decision-making of most people (also known in UK consumer protection legislation as the ‘average consumer’).²¹ These OCA practices influence our behaviour by leveraging well-known behavioural biases (see Table 5). Our hypothesis in this report is that there are certain contexts that consumers in vulnerable circumstances are more likely to find themselves in that contribute to a higher susceptibility to some of these behavioural biases, which in turn influences disproportionate harm from OCA. Based on a review of key papers from behavioural science, we identified four such contexts that we expected consumers in vulnerable circumstances were more likely to find themselves in and that have also been found to be associated with higher susceptibility to some behavioural biases:

1. **Having limited cognitive bandwidth** refers to when a person’s capacity to process and manage information is limited because they have other things on their mind. This has been studied specifically in relation to experiencing a financial shock, and the impact that this has on decision-making.²²
2. **Being in a hot state** refers to when a person’s decision-making is influenced by strong emotions, which can alter their perceptions of outcomes, as well as the quality and quantity of their ability to process information.²³
3. **Having difficulties with executive functions** refers to issues with the cognitive processes that help us manage, focus, and regulate our thoughts and actions. Executive functions include tasks like working memory, control of our inhibitions, planning, and task-switching. These are tasks that require us to focus our attention and problem solve, often towards a specific goal.²⁴
4. **Having lower literacy or digital skills** than the average or expected level may affect

²¹ The DMCC defines the average consumer as “reasonably well informed, reasonably observant, and reasonably circumspect.”

²² In the behavioural science literature, this is known as having a scarcity mindset. (We did not use this terminology given that it might raise confusion with the OCA practice of using scarcity claims). See for example Haushofer, J., & Salicath, D. (2023). The Psychology of Poverty: Where Do We Stand?. *Social Philosophy and Policy*, 40(1), 150-184.

²³ See for example Loewenstein, G. (2005). Hot-cold empathy gaps and medical decision making. *Health psychology*, 24(4S), S49.

²⁴ See for example Ferguson, H. J., Brunsdon, V. E., & Bradford, E. E. (2021). The developmental trajectories of executive function from adolescence to old age. *Scientific reports*, 11(1), 1382.

a person’s ability to understand some types of information or follow certain directions.

Note that the first three contexts (cognitive bandwidth, hot state, and executive function) are associated with how we think and make decisions, known as cognitive processes. The fourth context (literacy and digital skills) refers to capabilities.

These contexts can help to explain why, from a theoretical perspective, consumers in vulnerable circumstances may be disproportionately impacted by some OCA. Table 7 maps how these contexts relate to circumstances of vulnerability.²⁵

Table 7. Mapping circumstances of vulnerability to contexts associated with higher susceptibility to some behavioural biases

Circumstance	Contexts people in vulnerable circumstances are more likely to be in
Mental health issues ²⁶	People experiencing mental health issues are more likely to be experiencing low mood, which may make them more likely to be making decisions in a hot state . ²⁷ Some mental health conditions have also been found to be associated with difficulties with executive functions . ²⁸
Life events	People experiencing bereavement, job loss or relationship breakdown are likely to be more emotional, which makes them more likely to be making decisions in a hot state . These events are also often associated with financial shocks, which would make a person more likely to experience limited cognitive bandwidth .
Age	The executive functions of children and young people are still in development, meaning they often struggle with tasks such as controlling inhibitions. ²⁹ Children and young people may also still be learning how to regulate their emotions, which makes them more likely to be making decisions in a hot state . ³⁰ For older people, some executive functions such as working memory and

²⁵ There are other aspects that may be theoretically associated with consumer susceptibility to OCA practices. While we focused on cognitive processes and capabilities, we acknowledge there are other perspectives that can be used to explain why being in vulnerable circumstances might lead to higher susceptibility to OCA.

²⁶ Note that experiencing mental health issues encompasses a broad range of experiences from diagnosed conditions which have complex pathways to influencing behaviour through to self-reported low mood. This means the relationship between mental health problems and the contexts that influence susceptibility to OCA will vary depending on the severity and specificity of a person’s condition.

²⁷ See for example Holkar, Merlyn, and Chris Lees. 2020. “Convenience at a Cost .” Money and Mental Health Policy Institute. <https://www.moneyandmentalhealth.org/wp-content/uploads/2020/11/Convenience-at-a-cost-final-web-report.pdf>.

²⁸ See for example Snyder, H. R., Kaiser, R. H., Warren, S. L., & Heller, W. (2015). Obsessive-compulsive disorder is associated with broad impairments in executive function: A meta-analysis. *Clinical Psychological Science*, 3(2), 301-330; and Snyder, H. R. (2013). Major depressive disorder is associated with broad impairments on neuropsychological measures of executive function: a meta-analysis and review. *Psychological bulletin*, 139(1), 81.

²⁹ Ferguson, H. J., Brunson, V. E., & Bradford, E. E. (2021). The developmental trajectories of executive function from adolescence to old age. *Scientific reports*, 11(1), 1382.

³⁰ See for example Strough, JoNell, Tara E. Karns, and Leo Schlosnagle. 2011. “Decision-Making Heuristics and Biases across the Life Span.” *Annals of the New York Academy of Sciences* 1235 (1): 57–74. <https://doi.org/10.1111/j.1749-6632.2011.06208.x>; and Reyna, Valerie F., and Frank Farley. 2006. “Risk and Rationality in Adolescent Decision Making.” *Psychological Science in the Public Interest* 7 (1): 1–44.

	alertness have been found to decline with age (though some, such as planning, have been found to improve). ³¹ Older people have also been found as likely to have lower digital skills . ³²
Income or financial resilience	People on low income or with low financial resilience are more likely to experience financial shocks given they have less of a financial buffer, which makes them more likely to experience limited cognitive bandwidth . ³³
Education and capabilities	People with lower educational attainment have been found to be more likely to have lower literacy and/or digital skills . ³⁴
Learning disability	People with a learning disability often have difficulties with executive functions . ³⁵ They have also been found to be more likely to have lower digital skills . ³⁶
Timely moments	Timely moments that are associated with a low mood (such as the end of a long workday) may make people more likely to be making decisions in a hot state .
Emotional resilience	People with low emotional resilience are more likely to have emotional reactions to events. This would make them more likely to be making decisions in a hot state .
Learning difficulty³⁷	Learning difficulties such as ADHD have been found to be associated with difficulties in executive functions . ³⁸ Learning difficulties such as dyslexia affect information processing, which can affect literacy skills . ³⁹

Note that Table 7 does not include the following vulnerable circumstances:

³¹Ferguson, H. J., Brunsdon, V. E., & Bradford, E. E. (2021). The developmental trajectories of executive function from adolescence to old age. *Scientific reports*, 11(1), 1382; Naveh-Benjamin, M., & Cowan, N. (2023). The roles of attention, executive function and knowledge in cognitive ageing of working memory. *Nature Reviews Psychology*, 2(3), 151-165.

³² Lloyds Bank. (2023). *Lloyds Bank Consumer Digital Index 2023*. https://www.lloydsbank.com/assets/media/pdfs/banking_with_us/whats-happening/231122-lloyds-consumer-digital-index-2023-report.pdf

³³ Shah et al. (2012)

³⁴ Lloyds Bank. (2023). *Lloyds Bank Consumer Digital Index 2023*. https://www.lloydsbank.com/assets/media/pdfs/banking_with_us/whats-happening/231122-lloyds-consumer-digital-index-2023-report.pdf

³⁵ Spaniol, M., & Danielsson, H. (2022). A meta-analysis of the executive function components inhibition, shifting, and attention in intellectual disabilities. *Journal of Intellectual Disability Research*, 66(1-2), 9-31; Fidler, D. J., & Lanfranchi, S. (2022). Executive function and intellectual disability: Innovations, methods and treatment. *Journal of Intellectual Disability Research*, 66(1-2), 1-8.

³⁶ Lloyds Bank. (2023). *Lloyds Bank Consumer Digital Index 2023*. https://www.lloydsbank.com/assets/media/pdfs/banking_with_us/whats-happening/231122-lloyds-consumer-digital-index-2023-report.pdf

³⁷ As with mental health issues, the experiences of people with learning difficulties encompasses a broad range of experiences. This means the relationship between mental health problems and the contexts that influence susceptibility to OCA will vary depending on the severity and specificity of a person's condition.

³⁸ See for example Boonstra, A. M., Oosterlaan, J., Sergeant, J. A., & Buitelaar, J. K. (2005). Executive functioning in adult ADHD: a meta-analytic review. *Psychological medicine*, 35(8), 1097-1108.

³⁹ British Dyslexia Association. (n.d.). What is dyslexia? <https://www.bdadyslexia.org.uk/dyslexia/about-dyslexia/what-is-dyslexia>

- We did not include **physical health and disability** because we determined that experiencing physical health issues or physical disability on their own would not make a person more likely to experience limited cognitive bandwidth, a hot state, difficulties with executive functions, or lower literacy and digital skills. In our view, it would be other factors associated with physical health or disability (e.g. being older, experiencing a stressful life event) that would likely be driving vulnerability to OCA.⁴⁰
- We did not include **credulity** because propensity to believe certain claims has been found to be more related to context than to education or skills. For example, research on sharing misinformation found that this was not strongly linked to digital literacy, but rather more strongly linked to prior beliefs about the topic.⁴¹
- We did not include other protected characteristics, such as **ethnicity, gender, and sexuality**. There could be a theoretical argument that stress generated from discrimination limits cognitive bandwidth in the same way that financial stress has been shown to do. But it could also be that what is seen in the data is actually driven by another factor, such as income or mental health issues. In the end, we believed the strongest theoretical argument was that the disproportionate impacts of OCA reported by these groups were driven by another factor, rather than by these protected characteristics.

4.1.1 What behavioural biases are more likely to disproportionately influence consumers in vulnerable circumstances?

We identified four behavioural biases that we expected were theoretically likely to cause disproportionate harm to consumers in vulnerable circumstances. Table 8 presents these four behavioural biases (complexity, present bias, ease, and loss aversion) and theoretically links them to the contexts associated with circumstances of vulnerability.

Complexity, present bias, and loss aversion were identified in the CMA's *Evidence Review* (2022) as likely to disproportionately impact consumers in vulnerable circumstances. Ease, the fourth behavioural bias prioritised, was added based on the judgement of BIT researchers. Ease was added given its similarity to complexity: if consumers in vulnerable circumstances are more susceptible to complexity, they are likely also more susceptible to ease.

⁴⁰ We acknowledge that there are many online design decisions that impact people with a physical health condition or disability, including accessibility issues (e.g. making websites readable with a screen reader). These issues are important, but are not in scope in the definition of OCA practices used in this report.

⁴¹ See for example Buchanan, T. (2020). Why do people spread false information online? The effects of message and viewer characteristics on self-reported likelihood of sharing social media disinformation. *Plos one*, 15(10), e0239666.

Table 8. Behavioural biases identified as more likely to disproportionately impact consumers in vulnerable circumstances

Behavioural bias	Relationship to contexts of vulnerability	OCA practices relying on this bias	Example
Complexity: information is difficult or effortful to understand	We expect people who have difficulties with executive functions and lower literacy and digital skills to be particularly susceptible to complexity .	Partitioned pricing, bundling, choice overload & decoys, complex language,* information overload, sensory manipulation	Children are still developing their executive functions such as focus and attention. They're expected to be disproportionately impacted by complex language , such as the 'legalese' used in a privacy notice.
Present bias: tendency to choose immediate gratification (or delayed costs) at the expense of a larger future reward (or immediate costs)	We expect people with limited cognitive bandwidth , people who have difficulties with executive functions and people in a hot state to be particularly susceptible to present bias .	Sludge, dark nudge,* complex language,* prompts & reminders, commitment	People experiencing mental health issues are more likely to be making decisions in a hot state and some may experience difficulties with executive functions like controlling inhibitions. They're expected to be disproportionately impacted by dark nudges , such as one-click to buy buttons.
Ease: the absence of difficulty or effort (often in the form of not having to take action)	We expect people with limited cognitive bandwidth , people in a hot state , and people with lower digital skills to be particularly susceptible to ease	Defaults, ranking, dark nudge,* forced outcomes	People who are grieving a loved one (life events) are likely to be making decisions in a hot state and with limited cognitive bandwidth . They're expected to be disproportionately impacted by ranking , such as being less likely to scroll through to a second page of options on a shopping website.
Loss aversion: tendency to prefer to avoid losses than to acquire equivalent gains	We expect people with limited cognitive bandwidth and people who have difficulties with executive functions to be particularly susceptible to loss aversion .	Reference pricing, drip pricing, scarcity & popularity claims	People on low incomes are more likely to experience limited cognitive bandwidth because financial worries take up headspace. They're expected to be disproportionately impacted by scarcity and popularity claims , such when essential products are advertised as 'only 2 left.'

*OCA practices that appear under more than one behavioural bias

Having identified the four behavioural biases that we thought, from a theoretical perspective, were most likely to disproportionately impact consumers in vulnerable circumstances, we developed a list of OCA practices that we expected were likely to cause disproportionate harm to these consumers (see Table 9). This categorisation was relative: it does not mean that OCA practices identified as lower likelihood do not impact consumers in vulnerable circumstances; instead, OCA practices identified as higher likelihood were relatively more likely, based on theory, to impact consumers in vulnerable circumstances when compared to the general population.

Table 9. OCA practices categorised by likelihood of disproportionately impacting consumers in vulnerable circumstances

Likelihood of disproportionate impact on consumers in vulnerable circumstances	OCA practices		
	Choice structure	Choice information	Choice pressure
Higher likelihood based on theory	Defaults Ranking Partitioned Pricing Bundling Choice overload & decoys Sludge Dark nudges Forced outcomes Sensory manipulation	Reference pricing Drip pricing Complex language Information overload	Scarcity & popularity claims Prompts & reminders Commitment
Lower likelihood based on theory		Framing	Messengers Feedback Personalisation

4.2 What OCA practices disproportionately harm consumers in vulnerable circumstances?

In the previous section, we laid out a potential explanation for why, from a theoretical perspective, we would expect consumers in vulnerable circumstances to be disproportionately harmed by some OCA practices. In this section, we set out to understand what empirical research exists that examines OCA's disproportionate impact on consumers in vulnerable circumstances through an evidence review. A summary of the quality and quantity of the evidence on OCA and consumers in vulnerable circumstances is included in Table 10.

Overall, evidence looking at the relationship between OCA practices and consumers in vulnerable circumstances was scarce, and the quality of the evidence that does exist was low. For example, we did not find any studies looking at the disproportionate impact of OCA on people with learning difficulties, one that focused on people with disabilities, and one that focused on children and young people. The largest cluster of studies looked at demographic factors such as age (for adults), income, and education, as well as self-reported measures such as mental health issues.⁴² This is likely because these factors were easier to measure and recruit for research than some of the other groups. For all other areas, evidence was scarce: there were eight OCA practices and five circumstances of vulnerability for which we did not find any existing empirical research on disproportionate harm. For most other areas, there were only 1 or 2 studies, and no area was deemed to have strong evidence (defined as having either a meta-analysis or more than one real world impact evaluation, see Figure 2 and [Appendix D](#)). We expect the quality of evidence was low for a number of reasons, including:






- **Higher quality studies (e.g. meta-analyses and field RCTs) were scarce.** Most studies were online RCTs, observational studies, or surveys, making it more difficult to draw conclusions about the scale (online RCTs) or causal effects (observational studies and surveys) of OCA practices in the real world.⁴³
- **Studies looked at the influence of OCA practices on one consumer group,** rather than comparing differences between groups, making it difficult to understand whether the OCA practice resulted in disproportionate harm.
- **Studies typically had small sample sizes for consumers in vulnerable circumstances,** reducing the quality of subgroup comparisons.

⁴² Note that most of the studies on mental health were surveys commissioned by a single organisation (Money and Mental Health Policy Institute). It may therefore be that studies in this area were not driven by ease of measurement, but by having a dedicated organisation focused on driving the research agenda forward.

⁴³ Online RCTs are studies conducted in simulated online environments designed to mimic real world online environments. While these studies are useful for understanding causality and the direction of an effect, online RCTs tend to find larger effect sizes than equivalent field (or 'real world') RCTs. Observational studies are useful to understand trends, but are not able to isolate causal effects, given that they lack a comparison to a control group.

- **Studies recorded demographic data but did not conduct subgroup analyses.**
This could be due to sample sizes being too small to conduct subgroup analyses in a statistically rigorous way.
- **Studies examined specific examples of an OCA practice,** making it difficult to make a comprehensive assessment of the quality of evidence at the OCA practice level. For example, one study looked at visual interference (e.g. making an option more salient with bold colours) and another on hidden information, both of which fall under sensory manipulation, but which are quite different in their application and impacts.
- **Studies grouped together multiple OCA practices.** Some studies measured the effect of multiple OCA practices (e.g. overarching effect of social proof, scarcity and hidden costs) on subgroups, meaning we could not isolate differences in harm caused by different OCA practices. Some studies also assessed whether ‘dark patterns’ more broadly influenced customers, making it difficult to determine harm at the OCA practice level.
- **There was crossover between OCA practices,** which made it difficult to categorise studies under specific OCA practices. For example, manipulating the colour and placement of buttons to make them more intuitive to click could be categorised as a dark nudge or sensory manipulation.
- **Studies have been conducted on groups that were not in scope,** for example, there was a cluster of studies looking at the effect of social media influencers (an example of messengers) on young adult women. These were not in scope for our definition of consumers in vulnerable circumstances, so are included in a separate section (see [section 3.1.2](#)).

Figure 2. Legend for ratings in Table 10

					
Evidence of harm is of strong quality	Evidence of harm is of moderate quality	Evidence of harm is mixed	Evidence of no harm is of moderate quality	Evidence of no harm is of strong quality	No studies conducted
<ul style="list-style-type: none"> ● The circles in the table indicate that we found evidence looking at that specific OCA practice’s impact on a vulnerable group. ● The number in the circle indicates how many papers we found. ● The colour of the circle indicates the quality of the evidence we found. ● If the cell of the table does not have a circle, this means we did not find any studies looking at this OCA practice and vulnerable group. 					

See [Appendix D](#) for detailed criteria used to rate evidence strength and quality.

Table 10. Quality rating and quantity of evidence of disproportionate harm by OCA practice and vulnerable group

	Total no of papers	Older people	Children	Income	Education	Mental health	Physical disability*	Learning disability*	Learning difficulty	Emotional resilience	Timely moments	Life events	Credulity
Defaults	2	1		1									
Ranking	1	1		1	1	1							
Sensory manipulation	5	2	1	2	3								
Sludge	2	1		1	2								
Dark nudge	4			1		3							
Forced outcomes	1			1			1	1					
Framing	3	2		1	2								
Complex language	1					1	1	1					
Information overload	1			1									
Scarcity & popularity claims	3				2	1							
Feedback	2				2								
Personalisation	2	1		1		1							

*Research on disability did not distinguish between physical and learning disability, so the rating has been duplicated across both. There were no studies in scope for this report looking at choice overload and decoys, bundling, partitioned pricing, drip pricing, reference pricing, commitment, messengers, prompts & reminders.

4.2.1 Evidence by OCA practice

Defaults

Defaults are a predefined setting that the consumer must take active steps to change. **There was moderate evidence that online defaults disproportionately harmed low-income individuals and older adults, based on two studies.** In the first study, Beshears et al. (2010), analysed employee retirement plans and observed that low-income employees were more likely to stick with the high default contribution rate of 12%, even though this was not appropriate for their circumstances.⁴⁴ In another study, researchers found that older adults were more likely to be influenced by positive framing and opt-out defaults than other adults. The positive framing of defaults in question centred on positive reasons for accepting the greater disclosure of personal information.⁴⁵ Interestingly, despite their greater willingness to disclose information in response to a positively-framed default, older adults also expressed greater privacy concerns in response to it.

Ranking

Ranking refers to the order in which options are presented on a website or in a mobile application. **There was moderate evidence that ranking caused disproportionate harm among older people and people with lower confidence in their digital skills (i.e. education and capability), as well as moderate evidence of no disproportionate harm among those with mental health issues and lower income.** However, this evidence was based on findings from a single study.

The study was an online randomised controlled trial (RCT) which tested the impact of different algorithmic ranking designs in a simulated e-commerce platform.⁴⁶ The platform displayed an inventory of 432 headphones, ranking them according to one of three algorithmic designs: consumer-focused (which prioritised consumer preferences), commercially-focussed (which factored in consumer preferences alongside profit), and income-based (which showed participants the most expensive items first based on their household income). The results of the trial showed that older consumers (55+) generally overspent more (versus their stated preferences) compared to younger age groups, suggesting that older consumers may be more susceptible to overspending due to algorithmic rankings.

In terms of capabilities, a clustering analysis of results found that those who had the lowest confidence in their digital skills were also more vulnerable to the ranking algorithm, as measured in terms of overspend versus stated preferences. Participants who reported a mental health condition in the previous year, and who received Universal Credit, were less likely to overspend.

⁴⁴ Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2010). The limitations of defaults. NBER Retirement Research Center Paper No. NB 10-02.

⁴⁵ Anaraky, R. G., Lowens, B., Li, Y., Byrne, K. A., Risius, M., Page, X., Wisniewski, P., Soleimani, M., Soltani, M., & Knijnenburg, B. (2024). Older and younger adults are influenced differently by dark pattern designs. Manuscript submitted for publication.

⁴⁶ Human, S., & Jones, A. (2024). Testing the impact of algorithmic rankings on consumer choice. Department for Science, Innovation and Technology. Research Paper Number 2024/006.

Sensory manipulation

Sensory manipulation refers to when visual, aural and tactile features are used to steer consumers towards certain options. It includes making text larger or smaller, changing colour or position, as well as hiding text or options to make them harder to find. **We found moderate evidence that sensory manipulation disproportionately harmed older people, based on findings from two studies.** One online RCT found that older participants were significantly more likely to select an online subscription deal inconsistent with their stated preferences when information about that subscription was hidden, compared to younger adults (hidden information being a form of sensory manipulation).⁴⁷ Another online RCT found that older people were also slightly more vulnerable to a ‘false hierarchy’ effect (where certain information or options are made more salient through font size or colour), and were therefore more likely to accept an offer and make a payment for a fictitious investment product.⁴⁸

Figure 3. Example of sensory manipulation (false hierarchy)⁴⁹

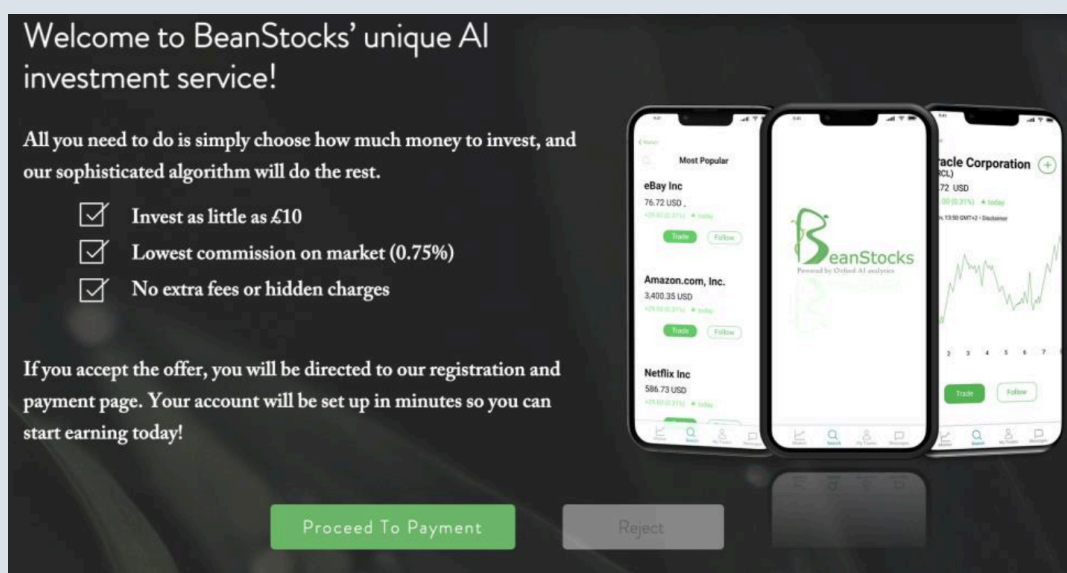


Figure 3 shows an example of false hierarchy as a type of sensory manipulation, where the reject button is presented as less prominent in light grey to divert consumer attention towards the payment button shown in bright green.

We found moderate evidence that sensory manipulation did not disproportionately harm children, however these findings were from a single study: children were less

⁴⁷ European Commission, Directorate-General for Justice and Consumers, Lupiáñez-Villanueva, F., Boluda, A., Bogliacino, F. et al., Behavioural study on unfair commercial practices in the digital environment – Dark patterns and manipulative personalisation – Final report, Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2838/859030>

⁴⁸ Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>

⁴⁹ Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>

likely than adults to misidentify commercial content (i.e. paid advertisements) among non-commercial content on YouTube.⁵⁰

There was mixed evidence on whether sensory manipulation disproportionately impacts people with lower education levels and lower incomes. For example, two online RCTs looking at hidden information found that people with lower education levels were more likely to select offers inconsistent with their preferences.⁵¹ However, another online RCT found that dark patterns which encompassed sensory manipulation did not disproportionately affect people with lower educational attainment.⁵² And while this study on dark patterns also found people on lower incomes were not disproportionately affected, survey data has found that people receiving Universal Credit were more likely to report that they had to cancel a payment as a result of purchases made due to deceptive design.⁵³

⁵⁰ Danish Competition and Consumer Authority. (2021). Consumers benefit from visually salient standardized commercial disclosures on social media. <https://www.kfst.dk/media/xraps3rw/20210617-consumers-benefit-from-visually-salient-standardized-commercial-disclosures-on-social-media.pdf>

⁵¹ European Commission, Directorate-General for Justice and Consumers, Lupiáñez-Villanueva, F., Boluda, A., Bogliacino, F. et al., Behavioural study on unfair commercial practices in the digital environment – Dark patterns and manipulative personalisation – Final report, Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2838/859030>; Luguri, J., & Strahilevitz, L. J. (2021). Shining a light on dark patterns. *Journal of Legal Analysis*, 13(1), 43-109. NB: results by education level were pooled and reported across trial arms for this study, so we have assumed that the disproportionate effect for those on lower education was replicated across trial arms (as this was not clear from the results reported in the paper itself).

⁵² Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>

⁵³ Citizens Advice. (2023). Pushed to purchase: Counting the cost of deceptive digital design in e-commerce.

Figure 4. Example of sensory manipulation (hidden information)⁵⁴

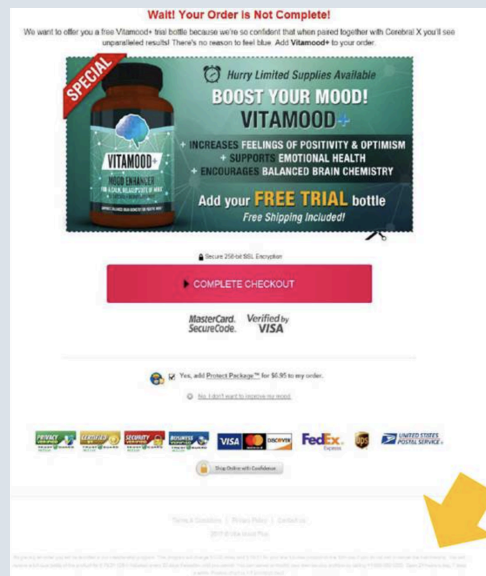


Figure 4 shows another form of sensory manipulation where the Terms and Conditions hyperlink (indicated by yellow arrow) is hidden both by placement (at the bottom), size of text (very small) and text colour (low contrast with background).

Sludge

Sludge refers to excessive or unjustified friction that makes it difficult for consumers to do what they want. **We found moderate evidence of a lack of disproportionate harm of sludge among older people and people with lower income (based on one study), but mixed evidence of harm on people with lower education (based on two studies).**

One online RCT found no evidence of disproportionate harm from sludge: in this experiment, participants were assigned either to a control with a neutral offer or one of four dark pattern conditions when evaluating an investment website, including a condition where it was easy to sign up for a product but difficult to cancel (known as a 'roach motel' design, and an example of sludge). The researchers found no significant differences in susceptibility to harm from sludge based on income or education level: while sludge was effective at influencing decisions across all participants, there was no evidence that higher income or education made people less susceptible. The same study found that older participants were overall less susceptible to sludge in the form of the roach motel compared to other adults (though they were found to be more susceptible to dark patterns overall).⁵⁵

⁵⁴ Federal Trade Commission. (2018, July 3). Time for a ROSCA recap: FTC says "risk free trial" was risky – and not free. <https://www.ftc.gov/business-guidance/blog/2018/07/time-rosca-recap-ftc-says-risk-free-trial-was-risky-and-not-free>

⁵⁵ Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>

Figure 5. Example of Roach Motel ⁵⁶

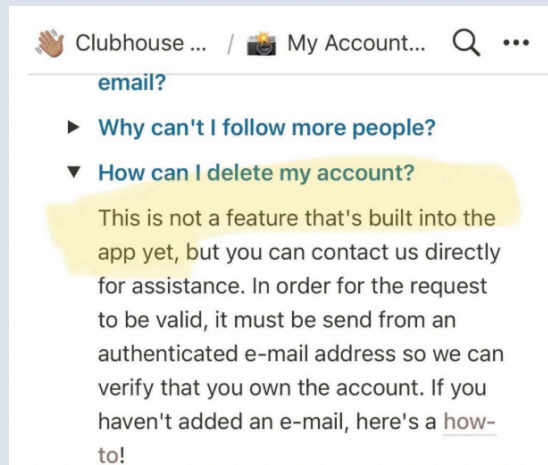


Figure 5 shows an example of Roach Motel where the user is prevented from easily deleting their account within the app and is instead required to navigate a series of cumbersome steps to delete.

However, another online RCT found that people with lower levels of education attainment did experience disproportionate harm from sludge: in that experiment, participants were exposed to either a control (no sludge) or one of two experimental conditions with increasing levels of sludge. The sludge made it difficult to decline an offer by increasing the number of clicks required and making it confusing to do so. This experiment found that people with lower levels of education were disproportionately more likely to be harmed by the sludge.⁵⁷

Dark nudges

Dark nudges are when making inadvertent or ill-considered decisions is made easy, so unwanted choices are selected by mistake. **We found moderate evidence from three surveys that dark nudges disproportionately harmed people with mental health issues from three surveys, and moderate evidence from one survey that people on low incomes were disproportionately harmed.** Note that the survey evidence focused on the experience of spending money online, rather than on specific dark nudge tactics.

⁵⁶ Post on Twitter, 13/02/2021. <https://twitter.com/mrmacleod/status/1360611361705885700>

⁵⁷ Luguri, J., & Strahilevitz, L. J. (2021). Shining a light on dark patterns. *Journal of Legal Analysis*, 13(1), 43-109.

Figure 6. Example of dark nudges (subscription trap)⁵⁸

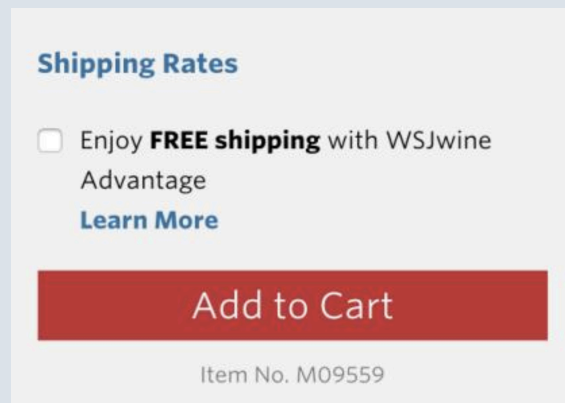


Figure 6 shows a subscription trap, a type of dark nudge, where selecting the checkbox for free shipping automatically adds a subscription (in this case to WSJwine Advantage) to the customer's cart.

One aspect of a dark nudge is when a website's design makes it easy to overspend. A survey of people in the UK by the Money and Mental Health Policy Institute (MMH) found that 37% of those who recently experienced a mental health problem agreed that online shopping didn't feel like spending real money, compared to 25% of those without mental health problems.⁵⁹ 54% of people with mental health problems felt that online shopping sites make it too easy to overspend.⁶⁰ (Similar findings emerged in a survey of gamblers in the US, where 40% of online gamblers who had experienced mental health problems agreed that they didn't feel like they were spending real money when gambling online, compared to 26% of those without mental health issues).⁶¹ The ease of borrowing money online also disproportionately affects those with mental health issues. The MMH survey revealed that 57% of people with mental health problems who have applied for credit online felt that it is too easy to borrow, and nearly half (46%) believed that borrowing encouraged them to spend more than they could afford, which was nearly double the percentage (24%) for those without mental health problems.⁶²

Another type of dark nudge is a subscription trap, where the consumer inadvertently signs up for a subscription they did not want. Survey data from the UK suggests recipients of Universal Credit were more likely to need to cancel a payment due to deceptive online

⁵⁸ Willis, L. E. (2020). Deception by Design. *Harvard Journal of Law and Technology*

⁵⁹ Holkar, M., & Lees, C. (2020). Convenience at a cost: Online shopping and mental health. Money and Mental Health Policy Institute.

⁶⁰ Holkar, M., Lees, C., & D'Arcy, C. (2021). Safety Net: Breaking the link between online financial harms and mental health problems. Money and Mental Health Policy Institute.

⁶¹ Holkar, M., & Lees, C. (2020). A Safer Bet? Online gambling and mental health. Money and Mental Health Policy Institute.

⁶² Holkar, M., Lees, C., & D'Arcy, C. (2021). Safety Net: Breaking the link between online financial harms and mental health problems. Money and Mental Health Policy Institute.

design such as a subscription traps, including payments for goods or services which auto-renewed.⁶³

Forced outcomes

Forced outcomes refers to when a choice is made for the consumer without their input or consent. Bait and switch is a form of forced outcomes where businesses advertise goods or services which are ostensibly a bargain, with the intention of substituting inferior or more expensive goods or services. By the time this becomes apparent to consumers, they may be unable to return the goods or cancel the service, or may not have the inclination or time to do so. **We found moderate evidence (based on survey data) that forced outcomes caused disproportionate harm among those on lower incomes and people with disabilities.** A survey of over 3000 UK adults found that around 1 in 5 found it 'too difficult or time consuming' to switch deals, thus enabling a 'loyalty penalty' (where established customers end up paying more for the same service than new customers). Crucially, the survey found that people on low incomes were twice as likely to be paying the 'loyalty penalty', whereas disabled people were twice as likely to be overcharged on mobile contracts.⁶⁴

Framing

Framing refers to how relevant information is presented to a consumer. **There was mixed evidence on whether framing had a disproportionate impact on consumers in vulnerable circumstances (based on three studies).**

There was mixed evidence on the effects of framing on older consumers. One online RCT, which looked at the impact of 'confirmshaming' (where consumers are shamed or guilted into taking a certain course of action) when presented with fictitious investment products, found that older people were more susceptible to this type of framing than other age groups.⁶⁵ However, another online RCT that varied the framing of privacy choices did not have a disproportionate effect among different age groups.⁶⁶

The online RCT on confirmshaming mentioned above did not find any evidence of disproportionate impact of confirmshaming on people with lower income or people with lower levels of educational attainment.⁶⁷ However, another online RCT found evidence that people

⁶³ Citizens Advice. (2023). Pushed to purchase: Counting the cost of deceptive digital design in e-commerce.

<https://www.citizensadvice.org.uk/Global/CitizensAdvice/Consumer%20publications/Pushed%20to%20Purchase%20Report.pdf>

⁶⁴ Greenall, A., & Sheehy, E. (2022). Overcharging consumers in a cost-of-living crisis: The loyalty penalty: 4 years on. Citizens Advice.

⁶⁵ Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>

⁶⁶ Adjerid, I., Acquisti, A., Brandimarte, L., & Loewenstein, G. (2013, July). Sleights of privacy: Framing, disclosures, and the limits of transparency. In Proceedings of the ninth symposium on usable privacy and security (pp. 1-11).

⁶⁷ Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>

with lower levels of education were more susceptible to dark patterns which included confirmshaming.⁶⁸

Figure 7. Example of confirmshaming, toying with emotion and testimonial⁶⁹

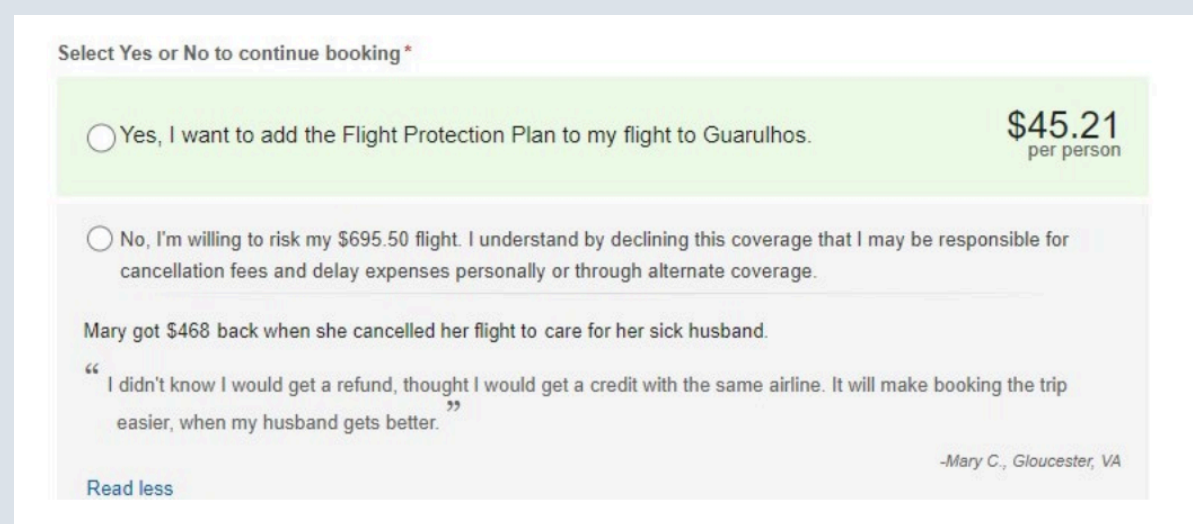


Figure 7 shows an example of confirmshaming on Expedia, where the option to decline flight insurance is framed as risky.

Complex language

Complex language refers to when information is made difficult to understand by using complicated words and/or sentence structures. **There was moderate evidence that complex language disproportionately harmed people with disabilities and people with mental health issues, based on findings from one survey.** Survey research in the UK has found that the complexity of price comparisons disproportionately impacted people with disabilities and people with mental health issues: the survey found that 1 in 3 people with a chronic mental health condition, and 1 in 4 people with a disability reported finding it difficult to switch contracts, compared with 1 in 5 consumers overall.⁷⁰

⁶⁸ Luguri, J., & Strahilevitz, L. J. (2021). Shining a light on dark patterns. *Journal of Legal Analysis*, 13(1), 43-109. NB: results by education level were pooled and reported across trial arms for this study, so we have assumed that the disproportionate effect for those on lower education was replicated across trial arms (as this was not clear from the results reported in the paper itself).

⁶⁹ European Commission, Directorate-General for Justice and Consumers, Lupiáñez-Villanueva, F., Boluda, A., Bogliacino, F. et al., Behavioural study on unfair commercial practices in the digital environment – Dark patterns and manipulative personalisation – Final report, Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2838/859030>

⁷⁰ Citizens Advice. (2023). Dialling up prices: Why mobile and broadband consumers need better protections from unfair pricing practices. <https://www.citizensadvice.org.uk/Global/CitizensAdvice/Consumer%20publications/Dialling%20up%20prices%20rpt.pdf>

Information Overload

Information overload is when a consumer is given so much information about a product or service that relevant information is difficult to find and assess. **There was moderate evidence that information overload disproportionately harmed people on low incomes based on one large study of clicking through to terms and conditions.** The study looked at whether potential buyers to software websites clicked to access user agreements and contracts. They found that very few people overall clicked through to read contractual information (only 1-2 per thousand people accessing the site), and those that did click through did not spend enough time on the page to read through the material. The researchers found that people on lower incomes were less likely to click through than people on higher incomes.⁷¹

Scarcity and popularity claims

Scarcity and popularity claims are used to inform consumers about limited stock, limited time to buy or high popularity of an item. **There was moderate evidence that scarcity and popularity claims disproportionately affected people on lower incomes and those with mental health issues, however findings were based on one study. There was mixed evidence (from two studies) on disproportionate effects for people with lower education levels. There were also studies that found that older adults were more likely to be influenced by scarcity and popularity claims, but these studies did not include results from people over 65 years of age.**

According to survey data from the UK, people with mental health issues were twice as likely to report feeling pressured to spend money whenever they go online (22% versus 11% for those without mental illness). The researchers theorised that this could be due to the disproportionate impact of scarcity or popularity claims.⁷²

A large field RCT in China found mixed impacts when looking at the disproportionate effects of a combined scarcity and social proof message on participants with lower and higher levels of income: some combinations (e.g. social proof combined with lower-level scarcity messaging - "998 items left") disproportionately impacted participants with higher education, while other combinations (e.g. social proof combined with higher-level scarcity messaging - "198 items left") disproportionately impacted participants with lower education levels.⁷³ An online RCT which tested, among other OCA practices, a scarcity message (that the deal would expire in 60 seconds, appearing with a countdown timer), found that people with lower education levels were disproportionately impacted.⁷⁴

⁷¹ Bakos, Y., Marotta-Wurgler, F., & Trossen, D. R. (2014). Does anyone read the fine print? Consumer attention to standard-form contracts. *The Journal of Legal Studies*, 43(1), 1-35.

⁷² Holkar, M., Lees, C., & D'Arcy, C. (2021). Safety Net: Breaking the link between online financial harms and mental health problems. Money and Mental Health Policy Institute.

⁷³ Zeng, Q. (2022). Nudging social online referrals: Evidence from a randomized field experiment (Publication No. 443) [Doctoral dissertation, Singapore Management University]. Dissertations and Theses Collection.

⁷⁴ Luguri, J., & Strahilevitz, L. J. (2021). Shining a light on dark patterns. *Journal of Legal Analysis*, 13(1), 43-109. NB: results by education level were pooled and reported across trial arms for this study,

We did not find any studies looking specifically at the effects of scarcity and popularity claims on people aged over 65. However, there were three studies that found older adults were more likely to be influenced by scarcity and popularity claims than younger adults.⁷⁵

Figure 9. Example of popularity claims⁷⁶

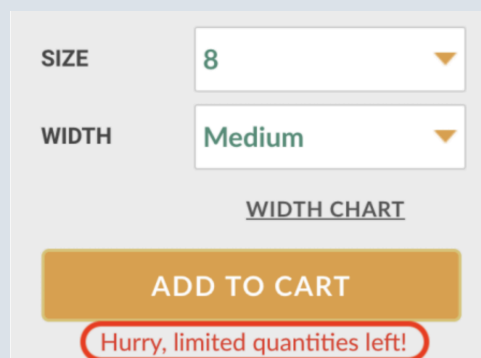


Figure 5 shows an example of scarcity claim, where the low stock message appears for all products on a shopping website and does not disclose the actual quantity in stock (orthofeet.com).

Feedback

Feedback refers to providing information about a particular person or group of people. Feedback can be about the consumer's own behaviour, or can be in the form of social norms, also known as 'social proof,' reporting the behaviour of a group. **We found moderate evidence that feedback in the form of social proof had a disproportionate impact on people with lower levels of education, based on findings from two RCTs.**

A large field RCT in China found that the presence of a social proof message (i.e. "90% people in your city have taken the offer") had a disproportionate impact on people with lower educational attainment.⁷⁷ An online RCT with a social proof message (i.e. "1,657 other

so we have assumed that the disproportionate effect for those on lower education was replicated across trial arms (as this was not clear from the results reported in the paper itself).

⁷⁵ Koh, W. C., & Seah, Y. Z. (2023). Unintended consumption: The effects of four e-commerce dark patterns. *Cleaner and Responsible Consumption*, 11, 100145.

<https://doi.org/10.1016/j.clrc.2023.100145>; Zeng, Q. (2022). Nudging social online referrals: Evidence from a randomized field experiment (Publication No. 443) [Doctoral dissertation, Singapore Management University]. Dissertations and Theses Collection.

Tuncer, R., Sergeeva, A., Bongard-Blanchy, K., Distler, V., Doublet, S., & Koenig, V. (2023). Running out of time(rs): effects of scarcity cues on perceived task load, perceived benevolence and user experience on e-commerce sites. *Behaviour & Information Technology*.

⁷⁶ Mathur, A., Acar, G., Friedman, M. J., Lucherini, E., Mayer, J., Chetty, M., & Narayanan, A. (2019, September 20). Dark patterns at scale: Findings from a crawl of 11K shopping websites. Princeton University.

⁷⁷ Zeng, Q. (2022). Nudging social online referrals: Evidence from a randomized field experiment (Publication No. 443) [Doctoral dissertation, Singapore Management University]. Dissertations and Theses Collection.

participants have accepted this free month...”) also found a disproportionate impact on those with less education.⁷⁸

Personalisation

Personalisation refers to the use of data to create a message or offer that is specific to the consumer. **We found moderate evidence that personalisation disproportionately harmed people with lower educational attainment, older people, and people with mental health issues. We found moderate evidence that personalisation did not disproportionately impact lower-income people.**

In one online RCT, participants were exposed to personalisation to nudge them towards one of two packages. The personalised nudge involved a salient message and an image, which was tailored according to personality profiling conducted at the beginning of the experiment. The results showed that the personalisation nudge was more likely to result in people with lower educational attainment and older people to make a choice that was inconsistent with their stated preferences. Interestingly, labour market status (a proxy for income) was not related to worse outcomes. The same experiment also induced a state of situational (transient) vulnerability among half of the study sample by placing a time constraint on their choice. This time constraint also significantly increased choices which were inconsistent with participants’ stated preferences.⁷⁹

We also found survey evidence that people with mental health issues reported being disproportionately harmed by personalised adverts online - 26% of these respondents agreed that seeing personalised adverts online makes it harder to stay in control of their spending, compared with 14% who have never had mental health issues.⁸⁰

4.2.2 Evidence by circumstance of vulnerability

In this section, we look at findings on disproportionate harm from OCA for older people, people on lower incomes, people with lower educational attainment, and people experiencing mental health issues. We focus on these circumstances of vulnerability because they were included in more than one study. It is important to note that it is difficult to draw conclusions or identify patterns even from these clusters of studies, as there were often only 1 or 2 studies of moderate quality per OCA practice. An important finding from this evidence review has been the lack of research on the impact of OCA on certain consumers in vulnerable circumstances, including people with learning disabilities (for which we found one study) and

⁷⁸ Luguri, J., & Strahilevitz, L. J. (2021). Shining a light on dark patterns. *Journal of Legal Analysis*, 13(1), 43-109. NB: results by education level were pooled and reported across trial arms for this study, so we have assumed that the disproportionate effect for those on lower education was replicated across trial arms (as this was not clear from the results reported in the paper itself).

⁷⁹ European Commission, Directorate-General for Justice and Consumers, Lupiáñez-Villanueva, F., Boluda, A., Bogliacino, F. et al., Behavioural study on unfair commercial practices in the digital environment – Dark patterns and manipulative personalisation – Final report, Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2838/859030>

⁸⁰ Holkar, M. & Lees, C. (2020). Convenience at a cost: Online shopping and mental health. Money and Mental Health Policy Institute.

people with learning difficulties (for which we didn't find any studies looking at the disproportionate impact of OCA).

People on lower incomes

There was mixed evidence that people on lower incomes experienced disproportionate harm from OCA based on eight research papers.⁸¹ People on low incomes were found to disproportionately overspend when faced with OCA practices including defaults, dark nudges, forced outcomes.⁸² One study also found people on low incomes were less likely to click through to read Terms and Conditions.⁸³ People on lower incomes were not found to be disproportionately impacted by framing or sludge,⁸⁴ and were found to be less likely to be impacted by ranking.⁸⁵ The findings on sludge were particularly surprising, given that sludge has been highlighted as especially likely to affect people on lower incomes.⁸⁶ This discrepancy could be explained by the fact that lower cognitive bandwidth has been found to be associated with financial shocks and uncertainty, rather than the circumstance of being on a low income.⁸⁷ In either case, it highlights the need for more research in this area.

People experiencing mental health issues

Across three surveys, people who reported experiencing mental health issues were more likely to report overspending, overborrowing, or feeling pressured when faced with dark nudges, scarcity and popularity claims, and personalisation.⁸⁸ People with mental health conditions were also more likely to report that they found it difficult to navigate the complex language involved in switching mobile and broadband contracts.⁸⁹ One online RCT, however, found that people who reported experiencing mental health issues were less likely to overspend compared to their stated preferences when faced with different ranking algorithms.⁹⁰

⁸¹ Note that one research paper may report the results of several different experiments or trials.

⁸² Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2010). The limitations of defaults. NBER Retirement Research Center Paper No. NB 10-02.; Citizens Advice. (2023). Pushed to purchase: Counting the cost of deceptive digital design in e-commerce.; Greenall, A., & Sheehy, E. (2022). Overcharging consumers in a cost-of-living crisis: The loyalty penalty: 4 years on. Citizens Advice.

⁸³ Bakos, Y., Marotta-Wurgler, F., & Trossen, D. R. (2014). Does anyone read the fine print? Consumer attention to standard-form contracts. *The Journal of Legal Studies*, 43(1), 1-35.

⁸⁴ Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>

⁸⁵ Human, S., & Jones, A. (2024). Testing the impact of algorithmic rankings on consumer choice. Department for Science, Innovation and Technology. Research Paper Number 2024/006.

⁸⁶ Sunstein, C. R. (2022). Sludge audits. *Behavioural Public Policy*, 6(4), 654-673.

⁸⁷ Haushofer, J., & Salicath, D. (2023). The Psychology of Poverty: Where Do We Stand?. *Social Philosophy and Policy*, 40(1), 150-184.

⁸⁸ Holkar, M. & Lees, C. (2020). Convenience at a cost: Online shopping and mental health. Money and Mental Health Policy Institute.; Holkar, M., Lees, C., & D'Arcy, C. (2021). Safety Net: Breaking the link between online financial harms and mental health problems. Money and Mental Health Policy Institute.;

⁸⁹ Citizens Advice. (2023). Dialling up prices: Why mobile and broadband consumers need better protections from unfair pricing practices.

⁹⁰ Human, S., & Jones, A. (2024). Testing the impact of algorithmic rankings on consumer choice. Department for Science, Innovation and Technology. Research Paper Number 2024/006.

One possible explanation for the difference in self-reported survey data and online experimental data may have to do with context: we theorised that people experiencing mental health issues were more likely to experience emotions that put them in a hot state, such as experiencing low mood during a depressive episode, which may make them more vulnerable to OCA. It is plausible that people experiencing mental health issues wouldn't necessarily be emotive, and therefore in a hot state, when participating in an online experiment, but they would be able to recall periods when they had been when responding to a survey. It may therefore be important to take the transitory nature of some contexts and circumstances of vulnerability into account when looking at evidence, and to triangulate this with self-reported accounts and lived experiences.

Older people

There was mixed evidence that older people were more likely to experience harm from OCA practices based on five research papers. We found moderate evidence that older people were disproportionately harmed by defaults, ranking, sensory manipulation and personalisation.⁹¹ There was also some evidence that older adults were more likely to be influenced by scarcity and popularity claims than younger adults, but these studies did not include results from people over 65 years of age, which was how we defined older people in this report.⁹² There was mixed evidence on the impact of framing on older adults: one study found that older adults were more susceptible to confirmshaming of investment products,⁹³ while another found no disproportionate effect of framing when it came to privacy choices.⁹⁴ Another study found that older people were less susceptible to harm from sludge.⁹⁵ This could indicate that older people are more susceptible to some OCA practices than others, but more research is needed. We'd expect factors such as digital confidence and skills to be a mediating factor to how impacted older people are by OCA. We also expect that

⁹¹ Anaraky, R. G., Lowens, B., Li, Y., Byrne, K. A., Risius, M., Page, X., Wisniewski, P., Soleimani, M., Soltani, M., & Knijnenburg, B. (2024). Older and younger adults are influenced differently by dark pattern designs. Manuscript submitted for publication.; Human, S., & Jones, A. (2024). Testing the impact of algorithmic rankings on consumer choice. Department for Science, Innovation and Technology. Research Paper Number 2024/006.; European Commission, Directorate-General for Justice and Consumers, Lupiáñez-Villanueva, F., Boluda, A., Bogliacino, F. et al. (2022). Behavioural study on unfair commercial practices in the digital environment – Dark patterns and manipulative personalisation – Final report.; Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>.

⁹² Koh, W. C., & Seah, Y. Z. (2023). Unintended consumption: The effects of four e-commerce dark patterns. *Cleaner and Responsible Consumption*, 11, 100145.; Zeng, Q. (2022). Nudging social online referrals: Evidence from a randomized field experiment (Publication No. 443) [Doctoral dissertation, Singapore Management University].; Tuncer, R., Sergeeva, A., Bongard-Blanchy, K., Distler, V., Doublet, S., & Koenig, V. (2023). Running out of time(rs): effects of scarcity cues on perceived task load, perceived benevolence and user experience on e-commerce sites. *Behaviour & Information Technology*.

⁹³ Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>

⁹⁴ Adjerid, I., Acquisti, A., Brandimarte, L., & Loewenstein, G. (2013, July). Sleights of privacy: Framing, disclosures, and the limits of transparency. In *Proceedings of the ninth symposium on usable privacy and security* (pp. 1-11).

⁹⁵ Zac, A., Huang, Y. C., von Moltke, A., Decker, C., & Ezrachi, A. (2023). Dark Patterns and Consumer Vulnerability. <https://ssrn.com/abstract=4547964>

disproportionate impacts would increase with age, giving the ageing process' impact on executive function (such as working memory) over time.

People with lower educational attainment

There was mixed evidence that people with lower educational attainment were disproportionately impacted by OCA practices based on four research papers. There were two studies, one field RCT and one online RCT, that found that a type of framing known as social proof messages (highlighting how many others had taken up an offer) disproportionately impacted people with lower levels of education.⁹⁶ For sensory manipulation, sludge, framing, and scarcity & popularity claims, the evidence was mixed. The study which looked at the disproportionate impacts of ranking measured digital skills, rather than educational attainment. This study found that lower digital skills were more likely to have overspent compared to their stated preferences.⁹⁷

While the evidence base is small, one explanation for the mixed findings for educational attainment could be that education is sometimes acting as a proxy for other things, such as digital skills. While we would not expect everyone with lower educational attainment to have lower digital skills, these circumstances are correlated.⁹⁸

4.2.3 Other evidence on OCA and consumers in vulnerable circumstances

There were some studies that found disproportionate harm for groups not included within the scope of our evidence review. These included:

- **Young women:** There was a group of studies that investigated how online messengers, including customer reviews, celebrity endorsements, and influencer marketing, impacted the purchase intentions of young women in Asia. **We found moderate evidence that online messengers affected this group.** In particular, celebrity messengers can lead to increased consumption of products promoted through celebrity endorsement.⁹⁹ It is important to note, however, that these studies

⁹⁶ Zeng, Q. (2022). Nudging social online referrals: Evidence from a randomized field experiment (Publication No. 443) [Doctoral dissertation, Singapore Management University].; Luguri, J., & Strahilevitz, L. J. (2021). Shining a light on dark patterns. *Journal of Legal Analysis*, 13(1), 43-109.

⁹⁷ Human, S., & Jones, A. (2024). Testing the impact of algorithmic rankings on consumer choice. Department for Science, Innovation and Technology. Research Paper Number 2024/006.

⁹⁸ Lloyds Bank. (2023). *Lloyds Bank Consumer Digital Index 2023*. https://www.lloydsbank.com/assets/media/pdfs/banking_with_us/whats-happening/231122-lloyds-consumer-digital-index-2023-report.pdf

⁹⁹ Macheke, T., Quaye, E. S., & Ligaraba, N. (2024). The effect of online customer reviews and celebrity endorsement on young female consumers' purchase intentions. *Young Consumers*. <https://doi.org/10.1108/YC-05-2023-1749>; Firmanza, M. H. D., & Artanti, Y. (2022). Online buying intentions of Shopee consumers: The influence of celebrity endorsement, social media marketing, and brand image. *Jurnal Manajemen Pemasaran*, 16(2), 87-95. <http://dx.doi.org/10.9744/pemasaran.16.2.87-95>; Sari, A. P., & Putri, S. E. (2023). The Effect of Celebrity Endorsement, Influencer Marketing, and Electronic Word of Mouth (E-WOM) on Online Shopping Purchase Intention with Brand Image as an Intervening Variable on TikTok Shop Users. *BICEMBA: 1st Bengkulu International Conference on Economics, Management, Business and Accounting*, 1(1), 240-251. <https://proceeding-bicemba.feb.unib.ac.id/index.php/bicemba>

did not always make direct comparisons between different groups, so the extent to which young women were disproportionately vulnerable was not definitive.

- **Induced time pressure: There was moderate evidence (based on a single study) that introducing time pressure did not result in disproportionate harm when exposed to OCA**, however this may be due to the structure of the study. In the online RCT, some participants were asked to make choices under time pressure, while others were given ample time to make choices. Those put under time pressure made worse choices overall, including in the control condition, by selecting an online subscription deal that was inconsistent with their preferences. However, the percentage increase in inconsistent choices when exposed to OCA practices was lower for those in the time pressure group than those without time pressure. This was likely because those in the time pressure group had worse outcomes in the control condition.¹⁰⁰
- **Induced material scarcity: We found moderate evidence (based on a single study) that induced material scarcity disproportionately harmed participants.** The study looked to make having fewer resources (material scarcity) salient to participants in an online gaming context. Participants were allocated to a 'rich' or 'poor' condition. The study found that 'poor' participants overborrowed compared to 'rich' participants.¹⁰¹

5. Discussion & recommendations

This project set out to understand what OCA practices disproportionately harm consumers in vulnerable circumstances, and why this might be. **We found a clear theoretical case for why consumers in vulnerable circumstances may be disproportionately harmed by OCA practices, but empirical research on the size, impact, and nature of this harm was scarce.** The lack of empirical research on how OCA disproportionately impacts consumers in vulnerable circumstances means that, despite having good reasons to expect these practices will have a greater impact on certain groups in vulnerable circumstances, we have an incomplete understanding of the specific harms caused by different practices, and how this manifests for different circumstances of vulnerability. This lack of research means we don't know how many elderly consumers are unintentionally signing up for services they don't want because it has been hidden as part of a 'free shipping' option; whether consumers with learning difficulties end up with sub-par products because of complex descriptions and decoys products; how much financial compensation people on low incomes have missed out on due to sludge in the application process; or how much distress people with mental health conditions are in when they have felt pressured to purchase something they hadn't planned.

¹⁰⁰ European Commission, Directorate-General for Justice and Consumers, Lupiáñez-Villanueva, F., Boluda, A., Bogliacino, F. et al., Behavioural study on unfair commercial practices in the digital environment – Dark patterns and manipulative personalisation – Final report, Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2838/859030>

¹⁰¹ Shah, A. K., Mullainathan, S., & Shafir, E. (2012). Some consequences of having too little. *Science*, 338(6107), 682-685.

It is reasonable to expect that some OCA practices will disproportionately impact consumers in vulnerable circumstances. **Regulators should therefore consider focusing on the disproportionate impacts on these groups when examining OCA practices.** A focus on vulnerability and OCA is urgent and timely: with the recent passage of the Digital Markets, Competition and Consumers Act (2024), policy-makers, regulators and online retailers will be looking to develop tools and insights both into the harms that OCA practices have on consumers in vulnerable circumstances, as well as into developing guidance, codes of practice and tools for how to design better products and services that allow these consumers to thrive in online marketplaces.

More research on vulnerability and OCA is needed to support the development of evidence-based policy, programmes, products, and services. The findings from this report call attention to the lack of research on the disproportionate impacts of OCA on consumers in vulnerable circumstances. This lack of research means it is difficult to develop the tools, guidance, and recommendations necessary to support consumers in vulnerable circumstances. Research that aims to develop a deeper understanding of the experiences of consumers in vulnerable circumstances will allow for more nuanced and therefore more effective action on OCA. Below, we've summarised recommendations for future research on the disproportionate impacts of OCA practices on consumers in vulnerable circumstances. We've grouped our recommendations under three themes:

- Fill gaps by conducting research on underrepresented groups
- Continue to conduct quantitative trials and collect data on circumstances of vulnerability
- Consider building towards industry and market initiatives

5.1 Fill gaps by conducting research on underrepresented groups

- **Consider collecting data on consumers' experience with mental health issues, where applicable, when commissioning quantitative research on OCA practices, including RCTs.** People experiencing mental health issues represent a large enough proportion of the population that we think quantitative research on disproportionate impacts as part of wider OCA research is appropriate. However, given the sensitive nature of this data (health data is special category data protected under the UK GDPR) and difficulties collecting it outside of simulated online environments, commissioners of research should consider the appropriateness of collecting and analysing this data based on whether there is a strong theoretical foundation for a separate subgroup analysis on consumers experiencing mental health issues. It is also worth supporting the continued collection of survey data for these consumers, given that simulated online experiments may not fully capture the contexts in which people experiencing mental health issues are most vulnerable to harm from OCA (for example, making decisions while in a hot state).
- **Consider commissioning user experience (qualitative) and survey (quantitative) research to better understand the experiences of consumers with learning**

difficulties and learning disability. The lack of quantitative evidence on the disproportionate impact of OCA on people with a learning disability or learning difficulties is understandable given that they represent a smaller share of the population overall, making it logistically more difficult to recruit a large enough group of consumers from these populations for statistically robust quantitative research. However, it is still important to build the evidence base on disproportionate harms from OCA, as well as on how to design better online experiences for these consumers. We therefore recommend that research with these groups focus on collecting survey data and conducting user experience research to gain insight into their experiences online, both to better understand and quantify harm but also to understand how to design better environments, products, and services to meet their needs.

- **Consider conducting studies that compare outcomes for adults and young people where they face similar OCA.** Much of the research on OCA and children and young people does not look at disproportionate impacts compared to adults. Research is often focused on looking at effects across children and young people. This is important and relevant, given the OCA practices that young people face are often unique to the online environments they find themselves in. However, there are circumstances where both adults and young people face the same OCA (for example, retail websites). The differential impacts of OCA practices on children and young people in these environments was understudied, and should be considered as part of future research agendas.

5.2 Continue to conduct quantitative trials and collect data on circumstances of vulnerability

- **Ensure specific subgroup analyses on age, income, and education level are conducted by default when commissioning quantitative research on OCA practices, including RCTs.** These measures are relatively easy to collect, and consumers in these circumstances (older people, people on lower incomes, and people with lower levels of educational attainment) are a relatively large proportion of the population, meaning subgroup analyses are feasible to conduct in a statistically robust way. Conducting these subgroup analyses by default (or at least clarifying why they shouldn't be conducted) will help build a more nuanced understanding of the disproportionate impacts of OCA on consumers in vulnerable circumstances.
- **Use online experiments to understand the relationship between the most harmful OCA practices, behavioural biases, and circumstances of vulnerability.** Future research can focus on quantifying how behavioural biases influence the relationships between OCA practices and harm for consumers in vulnerable circumstances. For example, online experiments could measure not only the disproportionate impact of dark nudges on the likelihood of consumers in vulnerable circumstances falling into a subscription trap, but could also seek to understand whether 'present bias' is influencing the size and direction of this impact. Building empirical evidence which increases our understanding of mechanisms influencing the

effectiveness of OCA practices will enhance our ability to develop design principles and techniques that reduce harm and support consumers in vulnerable circumstances to navigate choices online.

- **Encourage organisations that work with consumers in vulnerable circumstances to collect, label, and publish data on OCA harm.** Citizens Advice collect and publish advice trends that are used by policymakers and other interest groups to understand trends in consumer issues. Other organisations that provide support to consumers in vulnerable circumstances for example through a helpline could help to build evidence by introducing a label related to OCA to better identify online harms. Ideally, this data would then be published for others (including researchers and policymakers) to understand and use.
- **Consider commissioning research into behavioural factors that contribute to vulnerability to OCA.** In our project, we theorised that, among other things, lower digital skills may contribute to vulnerability to OCA practices. This implies that there may be factors such as familiarity or experience with a platform that could influence vulnerability to OCA. We think research into what behaviours or structural factors are associated with vulnerability to OCA could be an interesting additional perspective for understanding vulnerability to OCA.

5.3 Consider building towards industry and market initiatives

- **Identify opportunities for online market- or product-specific OCA research where consumers in vulnerable circumstances are likely disproportionately represented.** For example, Citizens Advice has identified Buy Now, Pay Later products as a potential market where people on low incomes may be disproportionately targeted. Other examples include mobile apps aimed at children and young people, private social care services (targeting older people and people with learning disabilities), and baby products (targeting people experiencing a life event).
- **Continue to measure the prevalence of OCA practices across leading online retailers and services, including instances where they are used in combination.** To prioritise OCA practices to research in more depth, we need to understand how prevalent they are and what OCA practices are typically used in conjunction. Further analysis could also help us to understand whether trends vary across sectors and allow us to identify which OCA practices are abundant in sectors utilised more frequently by consumers in vulnerable circumstances.
- **Use findings on prevalence and harm to develop a rating system that ranks the best and worst retail platforms for consumers.** Future research could also quantify the use of both beneficial and harmful OCA practices by online retailers and services and use this to rank websites or provide a website rating. Previous research has looked into harmful OCA practices on specific websites and compared these across

websites, but to our knowledge there is no standardised rating or ranking system used within the UK.¹⁰² Providing a ranking of the websites on their ease of use and use of deceptive OCA practices, or that calls out specific categories such as 'age-friendly design' could help steer consumers in vulnerable circumstances away from platforms that use OCA to deceive, and towards those that will help them make better and more informed choices. This ranking would also have the potential to change the behaviour of the websites themselves, encouraging websites to improve their digital design to increase their ranking, improving the overall experience of online retail in the UK.

¹⁰² For example, [Merchant Machine](#) wrote an article detailing and ranking the use of "dark patterns" in retail websites. The article highlighted common practices such as hidden subscription charges, misleading opt-outs, and hard-to-cancel services and ranked websites in terms of which used the most dark patterns. Another one-off study by [Rouge](#) Media ranked dark patterns across online fashion brands.

5. Appendices

Appendix A: Definitions of OCA practices

For this report, we are relying on the definitions provided in [CMA Evidence review of Online Choice Architecture and consumer and competition harm](#) (2022)

Table A: Definitions provided in the CMA Evidence review

OCA Practice	Definitions
Defaults	The choice architect applies a predefined setting that the consumer must take active steps to change
Ranking	The choice architect displays the order of options in a particular way.
Partitioned pricing	The choice architect presents individual price components without sharing the total or estimated total costs with the consumer.
Bundling	The choice architect groups 2 or more products and/or services in a single “package” at a special price
Choice overload	The choice architect provides too many options to compare.
Choice decoys	The choice architect adds an option to the choice set to make the other option(s) look more attractive to the consumer
Sensory manipulation	The choice architect employs visual, aural and tactile features to steer consumers towards certain options
Sludge	The choice architect creates excessive or unjustified friction that makes it difficult for consumers to get what they want or to do as they wish
Dark nudges	The choice architect makes it easy or removes friction for consumers to make inadvertent or ill-considered decisions, e.g. subscription traps
Forced outcomes	The choice architect changes the outcome without giving consumers a choice
Drip pricing	The choice architect initially shows only part of the price and reveals the full price of the product or service at later stages of the consumer journey
Reference pricing	The choice architect displays a previous (or future) price alongside the current price to make the current price look more attractive
Framing	The choice architect decides how decision-relevant information is described or presented to a consumer

Complex language	The choice architect makes information difficult to understand by using obscure words and/or sentence structure
Information overload	The choice architect gives a consumer too much information about a product or service such that information about the most relevant attributes is difficult to find and assess
Scarcity and popularity claims	The choice architect informs consumers about limited stock, limited time to buy or high popularity of an item
Prompts and reminders	The choice architect contacts the consumer to induce an action and/or follow up on a previous interaction
Messengers	The choice architect provides a platform on which a specific person or group can communicate with consumers
Commitment	The choice architect facilitates commitment by consumers to a particular behaviour in the future
Feedback	The choice architect provides consumers with feedback
Personalisation	The choice architect uses data to personalise offers

Appendix B: Vulnerability definitions

For this report, we reviewed vulnerability definitions across several regulators. These are provided in Table B.

Table B. Regulatory and legislative definitions of vulnerability

Financial Conduct Authority (FCA)

From the [Consumer Duty](#):

A vulnerable customer is someone who, due to their personal circumstances, is especially susceptible to harm...Characteristics of vulnerability may result in consumers having additional or different needs and may limit their ability or willingness to make decisions and choices or to represent their own interests.

Characteristics that increase risk of vulnerability:

- Health: conditions or illnesses that affect ability to carry out day-to-day tasks;
- Life events: bereavement, job loss or relationship breakdown
- Resilience: low ability to withstand financial or emotional shocks.
- Capability: low knowledge of financial matters or low confidence in managing money or other relevant areas such as literacy or digital skills.

Competition and Markets Authority (CMA)

Definition used in the [Evidence review of Online Choice Architecture and consumer and competition harm](#):

Consumers are vulnerable in any situation in which an individual may be unable to engage effectively in a market and as a result, is at a particularly high risk of getting a poor deal.

Characteristics-based vulnerability

- Mental health
- Age (children and young people, older adults)
- Educational qualifications
- Income and financial resilience

Context-dependent vulnerability*

- Life events
- Timely moments (time of day, day of the week, geographical location)

* Note that a [CMA report on consumer vulnerability from 2019](#) refers to market-based vulnerability, which is slightly different from the definition used in the evidence review.

Ofcom

[Vulnerable people page](#)

Anybody can face circumstances that lead to them becoming vulnerable – temporarily or permanently. This might include physical or mental health problems, specific characteristics such as age or literacy skills, or changes in personal circumstances such as bereavement, job loss or changes in household income.

Characteristics-based vulnerability:

- Physical problems
- Mental health
- Age
- Literary skills

Context-dependent vulnerability:

- Bereavement
- Job loss
- Changes to household income

Information Commissioner's Office (ICO)

[What does a vulnerable individual mean?](#)

Individuals can be vulnerable where circumstances may restrict their ability to freely consent or object to the processing of their personal data, or to understand its implications.

Most obviously, children are regarded as vulnerable to the processing of their personal data since they may be less able to understand how their data is being used, anticipate how this might affect them, and protect themselves against any unwanted consequences. This can also be true of other vulnerable sections of the population such as elderly people, or those with certain disabilities.

DMCC Act (2024)

[Section 245](#)

A group of consumers being particularly vulnerable to a commercial practice... is a reference to the members of the group being particularly vulnerable to the commercial practice causing them to take a transactional decision that they would not have taken otherwise... a group of consumers may be vulnerable as a result of (among other things)— (a) their age; (b) their physical or mental health; (c) their credulity*; (d) the circumstances they are in.

*The [Office of Unfair Trading](#) defined credulity as “consumers who may more readily believe specific claims.”

Equality Act (2010)

You're disabled under the Equality Act 2010 if you have a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on your ability to do normal daily activities.²

- 'substantial' is more than minor or trivial, eg it takes much longer than it usually would to complete a daily task like getting dressed.
- 'long-term' means 12 months or more, eg a breathing condition that develops as a result of a lung infection.

Protected characteristics (i.e. it is against the law to discriminate against anyone because of: age; gender reassignment; being married or in a civil partnership being pregnant or on maternity leave; Disability; race including colour, nationality, ethnic or national origin religion or belief; Sex; sexual orientation)

Table C. Source of definitions for factors contributing to vulnerability

Factor	Source
Physical health or disability: Physical impairment that has a 'substantial' and 'long-term' negative effect on your ability to do normal daily activities	UK Equalities Act
Mental health issues: Experience of conditions or disorders that mean you are unable to think, feel, or react in ways you need and want to live your life	Mind
Life events: Events such as bereavement, job loss or relationship breakdown	CMA, FCA, Ofcom
Income or financial resilience: Someone who has a low income or a low ability to recover quickly from income & expenditure shocks	LSE Centre for Analysis of Social Exclusion
Education and capabilities: Level of education attainment and level of digital skills, literacy skills or financial literacy	CMA, FCA, Ofcom
Learning disability: Reduced intellectual ability and difficulty with everyday activities	Mencap
Timely moments: Routine periods when consumers may be more susceptible to OCA, including for example scrolling late at night or on a specific day of the week	CMA definition of context-dependent vulnerability
Emotional resilience: Low ability to withstand emotional shocks	FCA
Learning difficulty: Problems processing certain forms of information	Foundation for people with learning disabilities
Credulity: Propensity to more readily believe specific claims	Former Office of Unfair Trading

Appendix C: Evidence review research approach

This appendix includes additional details on the research approach used in our evidence review. We used two approaches to identify research for the evidence review:

- Research published before 2022: we used the bibliography from the CMA's Evidence Review on OCA (2022);
- Research published in 2022 and after: we used a search strategy.

Evidence review method for research published before 2022

Prioritisation strategy for studies referenced in the CMA bibliography

The bibliography from the CMA Evidence Review (2022) had a high number of unique references (599), many of which were not directly relevant to our research questions. We selected which papers to take forward for closer review based on the following iterative approach:

1. Firstly, papers which were referenced in the 'vulnerability' section of the CMA's report were selected for closer review.
2. Secondly, papers referenced in other sections of the report were categorised as either relevant to our research questions, not relevant to our research questions, or unclear based on their titles.
3. Thirdly, for papers whose relevance to our research questions wasn't clear from the title, we downloaded the paper, scanned its abstract, and determined whether it was relevant to vulnerability and OCA. If the abstract mentioned both an OCA practice of interest and a vulnerability of interest, the paper was selected for further review.

Evidence review method for research published after 2022

Search strategy for studies on OCA published after 2022

A list of search terms relevant to the research question was created to run the search for papers published after 2022 (see Table D for search terms and keywords). These search terms were tested and applied across two online research databases: SSRN and Google Scholar. We tested search terms and search strings before assessing search results against our selection criteria we tested. We tested search terms and search strings to improve the relevancy of our results. Testing included:

1. Identifying other possible ways to refer to the OCA practice or popular examples of an OCA practice.
2. Identifying additional keywords and phrases to add to search strings (such as "online" and "consumer")
3. Adding 'Advanced search' criteria such as having keywords in the title of the article.¹⁰³

¹⁰³ For Google Scholar searches the search terms or specific OCA search term had to be in the title, apart from "decoy", "decoy pricing", "scarcity claims" and "popularity claims" and "online choice architecture".

Table D: Search terms and strings for OCA practice

Search terms	Additional keywords	SSRN search terms
online choice architecture		online choice architecture
dark pattern*		dark pattern
Specific OCA search terms ¹⁰⁴	Additional keywords	SSRN search terms
default*	AND "online"	default AND online
ranking	AND "online"	ranking AND online
partitioned pricing		partitioned pricing
bundling; product bundle		bundling; product bundle
choice overload; decoys; decoy pricing	AND "online" (<i>for Choice overload only</i>)	online AND choice overload; decoy; decoy pricing
sensory manipulation; visual manipulation	AND "online"	sensory manipulation; visual manipulation
sludge; friction	AND "online"	Sludge; friction
dark nudge*		dark nudge
forced outcomes; forced action		forced outcomes; forced action
drip pricing		drip pricing
reference pricing		reference pricing
framing	AND "purchase" OR "behaviour" OR "intention" OR "consumer" OR "customer"	framing AND online
complex language; complex vocabulary; complicated language; complicated vocabulary		complex language; complicated vocabulary
information overload	AND "online"	information overload AND online
scarcity claim*; popularity claim*		scarcity claims; popularity claims
prompt*; reminder*	AND "purchase" OR "behaviour" OR "intention" OR "consumer" OR "customer"	prompt* AND online; reminder* AND online
messenger*; celebrity; source	AND "online" OR "customer" OR "consumer" OR "consumers" OR "purchase" OR "purchases" OR "intention" OR "intentions"	celebrity AND online; messenger AND online; source AND online AND consumer
subscription; recurring payment; contract	AND "online" OR "customer" OR "consumer" OR "consumers" OR "purchase" OR "purchases" OR "intention" OR "intentions"	subscription trap; subscription AND consumer AND online; recurring payment AND consumer AND online
feedback; notifications	AND "online" OR "customer" OR "consumer" OR "consumers" OR "purchase" OR "purchases" OR "intention" OR "intentions"	feedback AND online AND consumer; notification AND online AND consumer
personali*ation	AND "online" OR "customer" OR "consumer" OR "consumers" OR "purchase" OR "purchases"	personalisation AND online; personalization AND online

¹⁰⁴ Search terms were not case sensitive.

Search strategy for grey literature on OCA published after 2022

In addition to searching databases, we searched relevant grey literature sites for relevant papers published after 2022. The grey literature institutions we searched are included in Box A. The list of grey literature was adapted from the CMA OCA evidence review and updated in consultation with Citizens Advice.

Box A. Grey literature institutions included in search for research published after 2022

1. ASA (Advertising Standards Authority)
2. Australian Competition and Consumer Commission
3. Behavioural Insights Team
4. Canada Competition Bureau
5. Canadian Office of Consumer Affairs
6. Citizens Advice
7. Competition and Markets Authority
8. Consumer Reports Advocacy (USA)
9. Danish Competition and Consumer Authority
10. Department for Business and Trade
11. Department for Science, Innovation & Technology
12. European Commission
13. European Consumer Centre Sweden
14. FCA (Financial Conduct Authority)
15. Federal Trade Commission
16. Forbrukerrådet (Norwegian Consumer Council)
17. Gambling Commission
18. Government Equalities Office and Equality and Human Rights Commission
19. ICPEN (International Consumer Protection and Enforcement Network)
20. Konsumentverket (Swedish Consumer Agency)
21. Money and Mental Health Policy Institute
22. Netherlands Authority for Consumers and Markets
23. New America Foundation (USA)
24. OECD (Organisation for Economic Co-operation and Development)
25. Ofcom
26. ParentZone
27. The Committee of Advertising Practice
28. The Money Advice Service
29. Which?

Cross-referencing

We used Elicit AI to cross reference additional studies that may have been relevant to our research question. The prompts we entered into Elicit are included in Table E. We reviewed the first 24 titles and abstract summaries for each prompt. We followed the same process of selection and assessment described in our research approach for any new papers uncovered through this tool (see [2.2. Research approach](#)).

Table E. Elicit prompts used

Prompt	Outcome
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<p><i>“What online choice architecture practices (online choice architecture is the design of the online environment where consumers interact with businesses) disproportionately harm vulnerable groups? “</i></p>	<p>Apart from one paper they were classified as irrelevant. The single paper was added to the coding framework for further assessment.</p>
<p><i>“What dark patterns (which are a set of (deliberately) manipulative practices identified by user experience (UX) designers) disproportionately harm vulnerable groups?”</i></p>	<p>All papers were classified as irrelevant.</p>

Using Claude AI for assessing research relevance and quality

Once a research paper was selected for further review, a PDF version of the paper was downloaded. The PDF was then uploaded into Claude, alongside a prompt to assist with our assessment of relevance and quality. The prompt used is included in Box B. This prompt was iterated and tested to ensure accuracy and to minimise incorrect or misleading results (sometimes referred to as ‘hallucinations’). For further quality control, the identification of subgroups was checked manually for each paper and the assessment of evidence quality was manually spot checked or checked when hallucination was suspected. We also incorporated additional spot checks of other paper information.

Box B. Claude prompt used in assessment and coding

Box B. Claude prompt used in assessment and coding

Hi Claude,

I have attached a research paper for you to read.

Once you have read the paper, I would like you to consider the two following questions

Question 1: Does the paper refer to any of the following online choice architecture (OCA) practices? Defaults; Ranking; Partitioned pricing; Bundling; Choice overload and decoys; Sensory manipulation; Sludge; Dark nudge; Forced outcomes; Drip pricing; Reference pricing; Framing; Complex language; Information overload; Scarcity and popularity claims; Prompts and reminders; Messengers; Commitment; Feedback; Personalisation. **Please make it clear whether these features are observed in an online or offline environment.**

If the paper does refer to any of these online choice architecture practices, please indicate which one(s). The paper may name the OCA practices slightly differently. If you think this is the case, please provide both the name used in the paper and the name used in the list above.

Question 2: Does the paper assess whether particular groups are vulnerable to the online choice architecture feature(s) identified? Assessment can include any references to different groups (e.g. age, gender) or reporting whether there are/are not differences between groups.

Particular groups of interest are: people with learning disabilities, people with learning difficulties, children (people under 18 years), people with mental health problems, people with physical

disabilities, older people, lower income / financial resilience, lower education / capability, lower emotional resilience, lower credulity, vulnerability due to timely moments (e.g. nightworking), vulnerability due to life events (e.g. relationship breakdown).

If the paper does suggest that particular groups are vulnerable to the OCA practices identified above, please state which group(s) this/these is/are.

Please also report any explanation provided by the paper for why this/these group(s) proved particularly vulnerable to this/these OCA practices. If this explanation is not provided, please also state that no explanation is provided.

Finally, please include any mechanisms for how these OCA practices cause harm. I am interested in the following: ease; complexity / friction costs; salience; present bias; loss aversion / regret avoidance; arouses emotions; social influence.

The paper may mention multiple mechanisms, or may use different terms. If you think this is the case, please include both the term used in the paper and the term used in the prompt here. If no mechanisms are mentioned, please also make this clear.

If the paper meets these criteria, I would now like you to rate the paper based on its quality and strength

To rank the quality of the paper, please assign it a score according to the following key:

Theoretical paper = 1

Observational evidence / correlational study / meta-analysis excluding studies with control groups = 2

Online randomised controlled trial OR quasi experimental design with a control group = 3

Field randomised controlled trial OR quasi experimental design with a control group = 4

Meta-analysis which includes studies with control groups = 5

Please make it clear what kind of research the paper presents when assigning it a score. Please provide evidence from the paper to support your conclusion.

To rank the strength of the paper, please indicate whether the intervention it was testing / observing had a

1. Null effects = 0
2. Mixed effect = 1
3. Statistically significant effect =2 (Please include the p-value and effect size (e.g. cohen's d) if they are reported)

It may be that an intervention was not tested in this paper. If that is the case, please make that clear.

I would now like you to answer the following prompts about the paper:

1. What did the researchers do? Please include:
 - a. Research aims / questions / hypotheses

- b. Summary of intervention (if applicable)
 - c. Sample size
2. Please briefly summarise the researchers' key findings (5-10 sentences)
 3. Please outline any case studies or real world examples included in the paper (where OCA practices harm a particular group, as per the prompts above).

Finally I would like you to provide:

- An APA citation of the paper

Throughout all steps, please include page numbers and direct quotations from the paper to support your points.


Make sure your answer is structured as bullet points, and that you directly answer the questions I have posed above.






Using Claude AI for synthesis

After we reviewed all papers identified as relevant (by Claude AI with human verification), we synthesised our findings. We decided to use Claude AI to conduct initial categorisation of our findings and draw out the key relationships between different OCA practices and aspects of vulnerability. To do this, we exported our spreadsheets from Google Sheets as PDFs, and uploaded them to Claude AI. We prompted Claude to return a bullet point list of the key findings, organised by OCA practice. This provided a good (if incomplete) initial picture of which OCA practices and aspects of vulnerability were most well-evidenced. We then manually reviewed the spreadsheets to supplement Claude AI's output, ensuring that all relevant evidence would be included in our findings.

Appendix D: Evidence review ratings

Table F: How we rated evidence quality

Category	Strength criteria	Quality of evidence
 Strong empirical evidence of harm	<p>Evidence suggests a significant effect (e.g. the OCA practise <u>disproportionately</u> harms vulnerable groups).</p> <p>Excludes papers with no subgroup comparison.</p>	<p>Actions in this category are characterised by evidence that includes at least one of the following type of evidence:</p> <ol style="list-style-type: none"> 1. Meta-analysis which includes studies with control groups (quality score = 5) <p>OR at least two of this type of evidence:</p> <ol style="list-style-type: none"> 2. Field randomised controlled trial OR quasi experimental design with a control group (quality score = 4)

 <p>Moderate empirical evidence of harm</p>	<p>Evidence suggests a significant effect (e.g. the OCA practise harms vulnerable group).</p> <p>Includes papers which focus solely on one age group (e.g. no comparison).</p>	<p>Actions in this category are characterised by at least one of the following types of evidence:</p> <ol style="list-style-type: none"> 1. Single field randomised controlled trial OR quasi experimental design with a control group (quality score = 4) 2. Online randomised controlled trial OR quasi experimental design with a control group = 3 3. Observational evidence / correlational study /survey data
 <p>Mixed empirical evidence of harm</p>	<p>Evidence goes in both directions (show a significant effect (e.g. sometimes show the OCA practise harms vulnerable groups, sometimes show the opposite, sometimes show no effect).</p>	<p>Actions in this category are characterised by any of the above evidence.</p>
 <p>No empirical evidence of harm - strong</p>	<p>Evidence suggests significant null or negative effects (e.g. the OCA practise does not <u>disproportionately</u> harm a vulnerable group).</p> <p>Excludes papers with no subgroup comparison.</p>	<p>Actions in this category are characterised by evidence that includes at least one of the following type of evidence:</p> <ol style="list-style-type: none"> 1. Meta-analysis which includes studies with control groups (quality score = 5) <p>OR at least two of this type of evidence:</p> <ol style="list-style-type: none"> 2. Field randomised controlled trial OR quasi experimental design with a control group (quality score = 4)
 <p>No empirical evidence - moderate</p>	<p>Evidence suggests significant null or negative effects (e.g. the OCA practise does not <u>disproportionately</u> harm a vulnerable group).</p> <p>Includes papers which focus solely on one age group (e.g. no comparison).</p>	<p>Actions in this category are characterised by at least one of the following types of evidence:</p> <ol style="list-style-type: none"> 1. Field randomised controlled trial OR quasi experimental design with a control group (quality score = 4) 2. Online randomised controlled trial OR quasi experimental design with a control group = 3 3. Observational evidence / correlational study / meta-analysis excluding studies with control groups = 2
 <p>No studies conducted</p>	<p>No studies have investigated this relationship.</p>	

