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ARTICLE

Trading is a losing game: an audit of deceptive choice architecture in demo-mode Contract for Difference (CFD) trading apps

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Abstract

Mobile-based trading apps have made investing easier than ever before, but this includes enabling access to risky investments that many investors may not be able to trade safely. The UK financial regulator thereby requires Contract for Difference (CFD) trading apps to make disclosures such as, '89% of retail investor accounts lose money when trading CFDs with this provider'. However, these disclosures might be counteracted by either their sub-optimal implementation, or by other aspects of these apps' deceptive choice architecture. Therefore, the present study audited choice architecture characteristics of demo-modes of the 14 most-popular CFD trading apps in the UK. A content analysis found for example that 31.6% of risk warnings did not comply with the regulator's standards, and that only 35.7%% of apps contained risk warnings within the app's main tabs. A thematic analysis suggested that apps' educational resources could instil users with the hope of winning, by emphasising practice, strategies and psychological mindset – instead of acknowledging luck as the predominant factor underlying CFD trading profitability. Overall, this study added to previous research highlighting the similarities between certain high-risk investments and gambling, and added to the behavioural public policy literature on deceptive choice architecture.

Keywords: dark nudges; dark patterns; investing; personal finance; sludge

Introduction

Since traders first met in market squares, waves of technological change have transformed the investing world, with the telegraph, telephone, computers and internet reducing the cost and barriers of market access (Belk and Llamas, 2013). Mobile-based trading apps might claim to be the latest step in this trend, with for example the popular US-based app 'Robinhood' being named after a character from British folklore who robbed from the rich to give to the poor. However, trading apps have also been reported

in the news relating to first-person accounts of financial ruin (Stewart, 2021; Major, 2023). These harmful outcomes are more reminiscent of those from heavy gambling, which has led to the term 'gamblification of investing' (Newall and Weiss-Cohen, 2022). Contracts for Difference (CFDs) are one 'gamblified' financial product that is available in many trading apps.

CFDs, also known as 'spread-betting', essentially involve betting on the future price of another financial asset, such as a company's stock, without having to own it (Capelle-Blancard, 2010). Instead, CFDs are settled at the difference, or spread, between the price when the position was opened against the price when the position was closed, hence the name. Because the underlying financial asset of a CFD is not actually bought, this reduces the amount of money needed to enter such a transaction: the client is required to post margin, or a deposit, against potential losses, which is considerably lower than the money needed to buy the assets outright (similar to buying futures). This allows for easy leverage, as with the same amount of money traders can get higher exposure to price movements: with a deposit of £100, a client can take a position similar to buying £2,000 worth of stocks (assuming leverage of 20:1). Leveraging also increases risk and amplifies price movements: in this example, if the stock price falls by 5%, the client would lose 100% of their deposit. CFDs also provide a simple way for traders to benefit from prices going down ('shorting'), a risky strategy previously reserved only for the most sophisticated investors. A client with a short position with similar 20:1 leverage would lose 100% of their deposit if the price of the stock goes up by 5%. CFDs are not inherently risky, and if used sensibly, for example without leverage, they can provide an alternative to direct stock ownership with lower settlement costs. However, CFDs have become a popular way for unsophisticated retail investors to make risky trades in for example the UK and EU (Brown *et al.*, 2010; Capelle-Blancard, 2010). Studies of trader accounts have shown that leveraging and shorting increase risks and reduce investment performance (Engelberg *et al.*, 2018; Gargano *et al.*, 2018; Heimer and Simsek, 2019; Subrahmanyam *et al.*, 2024).

As a result of unsophisticated investors accessing high risk products, the average outcome of retail CFD investing in Europe is a loss, and regulators in the EU and UK require CFD providers to disclose the percentage of trading accounts that lose money overall (Delias *et al.*, 2022; Financial Conduct Authority, n.d.). Resulting loss percentages for various CFD providers have ranged from 74% to 89% (European Securities and Markets Authority, 2019; Carlson, 2021; Petar, 2021), which supports comparisons with gambling, where an overwhelming majority loses money. Multiple studies carried out by ten National Competent Authorities across different jurisdictions overseen by The European Securities and Markets Authorities calculated the average outcome per retail client investing in CFDs to be a loss ranging from €1,600 to €29,000 (for individual study details, see European Securities and Markets Authority, 2018, recital 35 i–x). Among those, we highlight the UK where two separate analyses by the Financial Conduct Authority (FCA) have identified that the average outcome of trading CFDs was a loss of £2,200 (Financial Conduct Authority, 2016) and a loss of £4,100 (Financial Conduct Authority, 2018). These amounts are not trivial, in particular when we consider that the average CFD investor is not rich. According to the FCA, the average annual income of clients in one firm was between £15,000 and £30,000 (Financial Conduct Authority, 2016). But why invest in something that will probably lose money

that you cannot afford to lose? Any answer is surely subject to multiple contributing factors. Here, we will first review individual-level factors highlighted by both the behavioural finance and gambling literatures, before turning to our own contribution which focuses on deceptive choice architecture.

CFDs (and similar instruments called 'derivatives') can be used for hedging, a sophisticated strategy where an investor attempts to reduce certain types of risk, and the loss from a CFD would be associated with a gain in another position (Brown *et al.*, 2010; Foster *et al.*, 2019). However, retail investors rarely use derivatives for hedging (Lakonishok *et al.*, 2007; Bauer *et al.*, 2009). Instead, many retail investors seek high-risk high-frequency investments, such as leveraged CFDs, for excitement and entertainment (Dorn and Sengmueller, 2009; Grinblatt and Keloharju, 2009; Oehler and Schneider, 2022). CFDs are also attractive in the context of 'social trading', allowing small retail investors to replicate large portfolios of other (seemingly successful) accounts with little investment, due to leveraging (Doering *et al.*, 2015; Dorfleitner and Scheckenbach, 2022).

Behavioural finance research has also highlighted the roles of overconfidence (Barber and Odean, 2000, 2001; Nosić and Weber, 2010) and low financial literacy (Lusardi and Mitchell, 2014) in suboptimal investing. Overconfident investors trade more frequently and achieve worse returns than their less confident peers (Barber and Odean, 2000). Many individual investors also fail even a basic three-item measure of financial literacy (Lusardi and Mitchell, 2014), a notable failure given the complexities of leveraging and the sophisticated investments that mobile-based trading apps provide access to (Bauer *et al.*, 2009; Chague *et al.*, 2019; Carlson, 2021). Meanwhile, the gambling literature highlights the addictive potential of random outcomes, which can create a behavioural dependence toward risk-taking despite monetary loss and harm (Browne and Rockloff, 2020). This perspective also appears relevant, given the frequency with which investment-related keywords feature in gambling self-help communities (Bradley and James, 2021), and with which traders appear at gambling treatment clinics (Turner, 2011; Granero *et al.*, 2012; Grall-Bronnec *et al.*, 2017). The gambling literature also highlights cognitive illusions such as the 'illusion of control' (Burson *et al.*, 2006) as reasons for why losing gamblers persist, which again appears relevant given the typical loss associated with the investments and strategies that mobile-based trading apps provide access to.

However, individual-level factors can only be at most part of the story in our interconnected digital world. The gambling literature has long highlighted how product-level factors such as electronic gaming machines' fast speed-of-play and immersive audiovisual feedback also contribute to harmful engagement (Schüll, 2014). These features are present in online gambling, which is also available at all times of day, and from any location with mobile-based gambling (James *et al.*, 2023). Unsurprisingly, a recent international meta-analysis estimated online gambling as the strongest risk factor for experiencing gambling-related harm (Allami *et al.*, 2021). Meanwhile, behavioural public policy research has recently highlighted the various ways that online environments can be designed in deceptive ways (Sin *et al.*, 2022; Mills *et al.*, 2023). This work has also found applications in online gambling (Fortier *et al.*, 2024), under various related terms of 'dark nudges' (Newall, 2019) 'dark patterns' (Behavioural

Insights Team, 2022) and 'sludge' (Newall *et al.*, 2022). Here we will use the inclusive term 'deceptive choice architecture', to refer to any of these potentially exploitative techniques.

Some of this gambling research could be relevant to the mandated risk warnings for CFD providers. The UK gambling regulator the Gambling Commission requires online casinos to disclose the average percentage of all money staked that is lost (i.e., the 'house-edge') or its complement, how much is won (i.e., the 'return-to-player'), on games such as roulette or slot machines. This is because these numbers can be readily calculated in simple games such as this (Newall *et al.*, 2023b), and because the provision of such information could help gamblers to make more informed choices (Blaszczynski *et al.*, 2004). However, even though the regulator writes that this information 'must be easily available', an audit study showed that gambling operators interpreted this vague guidance in ways that may serve the providers' interests. This information was placed an average of 1.3 clicks away from the main roulette page, almost always in a small and nondescript font, and on help-screens which contained an average of over 2,000 words of text (Newall *et al.*, 2022). Relatedly, financial actors including CFD providers are meant to provide risk and cost disclosures, in order to provide investors with detailed information about their products. However, in other consumer domains, it has been suggested that risk disclosures can also be made difficult to find, and tend to make important information hard to find by making these disclosures overly long and complex (Bar-Gill, 2013). An audit study of how CFD providers place their related mandated risk warnings and risk disclosures appears justified, therefore, to see whether similar techniques are used to reduce their prominence or potential usefulness.

Demo accounts also appear relevant to both gambling and mobile-based trading. Demo accounts were first highlighted as a deceptive choice architecture feature in gambling by research illustrating how these modes could bias the chances of winning. So unlike in actual gambling, the average slot machine user would 'make' demo account money over time (Abbey and Doukas, 2015; Scibetta, 2019), leading the Gambling Commission to ban the biasing of demos (Gambling Commission, 2021). Some initial work has correspondingly been done on users' experiences of demo accounts in trading (Mukaram and Siti Sarah, 2018); however, more audit-based work on the design of demo accounts in mobile-based trading apps appears warranted, as these might be used especially by inexperienced investors, and especially for apps which provide access to CFDs.

Signing-up for a demo account in a trading app will also lead to users giving their email address to a provider. In online gambling, this can lead to the user then receiving a high frequency of marketing messages, via push notifications and email (Parke *et al.*, 2015; Arnold *et al.*, 2022). The receipt of these marketing messages has been linked to increases in subsequent gambling behaviour (Russell *et al.*, 2018; Hing *et al.*, 2019; Rawat *et al.*, 2020). Recent research conducted by the UK financial regulator the FCA has similarly linked these types of marketing messages to riskier investment behaviour, especially among inexperienced investors (Arnold *et al.*, 2022; Hayes *et al.*, 2022; Gathergood *et al.*, 2024). Therefore, further investigation of the frequency of email and push notification marketing appears warranted in the context of mobile-based CFD provider demo accounts, which could be nudging inexperienced investors towards especially risky investments.

Finally, demo accounts of mobile-based CFD providers may feature potential deceptive choice architecture features that have not been subject to previous research either within investing or are without a corresponding exemplar from gambling. Gambling regulations tend to strictly disallow anything which implies that gambling can be a good way of making money (The Advertising Standards Authority, 2010a, 2010b). Financial regulators such as the FCA tend to have strict rules about financial advice, both in terms of who can provide it and what format it can take (Financial Conduct Authority, 2024). However, the provision of educational resources might be a relevant underexplored loophole. A first-person account from someone who experienced large financial losses and harm from spread-betting, reports how informational resources and training sessions were offered to encourage losing investors to persist in new trading strategies (Stringman, 2017). Similarly, some recent research on day-trading adverts on Instagram shows how these adverts often promote tools or strategies, and that these are sometimes even marketed toward losing traders in a way that could perpetuate a false hope of winning (Whybrow *et al.*, 2024). An exploratory investigation of the underlying themes and suggestive implications from CFD trading apps' educational resources therefore appears warranted.

Therefore, the present study set out to contribute to understanding in these areas via an audit of the demo accounts of the 14 most popular CFD trading apps in the UK. In a mixed-methods approach, a content analysis first quantified the presence of consumer protection features, such as risk warnings and disclosures, and user engagement practices, such as email communications and push notifications. A random subset of these apps' educational resources were then transcribed and subjected to a thematic analysis – a widely used qualitative approach used to infer underlying themes from textual data (Braun and Clarke, 2006). The overall aim was to provide suggestions for how future work may seek to answer the question posed at the start, about why people might make high-risk investments that will probably lose money.

Method

Ethics

The dataset for this study comprises online media resources that are publicly available and intended for public use and engagement. Ethical approval was not required since the research did not involve direct interaction with human participants.

Open science practices

The present study's preregistration, sampling strategy, original data, codebook, files relevant to the dual-coding process and recordings of all downloaded mobile apps are accessible at https://osf.io/s5qdt/. Preregistration can benefit qualitative research by clarifying research intentions, thus adding a layer of rigour and accountability (Haven and Van Grootel, 2019). Moreover, our open sharing of materials from the audit itself is intended to enable future researchers to either replicate or improve upon these methods, as follows recent related work (citation blinded for review).

Content analysis

Sample selection

We aimed to select a sample of popular CFD platforms available on both Apple and Android mobile phones in the UK. This was done between 1 November and 20 December 2023 via searches in the latest versions of the Apple Store and Google Play Store, Google searches and by collating apps listed in independent websites. Trading apps were then excluded for (1) not offering CFD trading; (2) not being available on both Apple and Google platforms; (3) offering just blockchain/cryptocurrency trading; (4) apps not developed by the broker or available only through third-party platforms (e.g., Metatrader 4); and (5) duplicate apps developed by the same group of developers. Apps were then ranked by number of user downloads via information available on http://data.ai, and the top 14 by popularity selected, which accounted for 92.0% of all UK-based downloads in the past 12 months. Initially preregistered for 15 apps, the final sample was adjusted to 14 due to several top-downloaded apps meeting various exclusion criteria. Including a 15th app would only minimally increase total download coverage from 92.0% to 92.3%, making 14 apps sufficiently representative. Fourteen is also the same size used in a recent audit study of deceptive choice architecture more broadly (Mills *et al.*, 2023).

Coded features

Table 1 details the two main categories of features coded from each trading app, alongside any deviations from the preregistration document. The first category on consumer protection features recorded the visibility and format of risk warnings and disclosures, as well as if they met regulatory standards and were easily accessible to users. In this context, warnings refer to short messages found in different locations across the app, designed to inform users of the risks associated with trading different high-risk instruments (e.g., '89% of retail investor accounts lose money when trading CFDs with this provider'). Risk disclosures are longer documents providing a comprehensive overview of the risks of trading that can only be found in specific locations alongside other disclosures and agreements. The second category of user engagement practices assessed how email communications and push notifications might keep users engaged, promote services and communicate risk, providing insights into the apps' strategies for interaction beyond the app interface. Data were collected via screen recordings of app usage, emails and notifications using two phones, one Android and one Apple iPhone, to capture a broad user experience. The complete coding scheme used for each of the variables can be found at https://osf.io/s5qdt/.

Dual-coding

Seven apps were randomly selected for dual coding. The primary coder initially created detailed screen recordings for each app. The recordings included both the in-app features and any emails and notifications generated by the apps. These recordings then served as a basis for the secondary coder to independently complete the codebook. Percentage agreement was used as the interrater reliability metric, with a preregistered acceptable threshold of 75% for each variable, which is a slightly higher threshold than the 70% previously suggested by quantitative researchers (Stemler and Tsai, 2008). Full agreement (100%) was reached when both coders assigned the same code across all 7 apps for a given feature. Any disagreement was thoroughly discussed and resolved

Table 1. Coded features

Category	Features	Summary	Deviations from OSF
Consumer protection features	Risk warnings	Coders focused on high-visibility areas (app store description, sign-up screen, main menu) to locate risk warnings and note their order of appearance. Warnings were assessed for FCA regulation compliance, and their screen position (top, central, bottom) and font size (smaller, same, bigger) relative to surrounding text. Additionally, risk warnings linked to external websites were noted.	Two additional categories were created for risk warnings. These categories account for the warnings that appeared in the images available in the app stores and warnings that were found in submenus while coders were coding other variables (e.g., risk disclosures). Additionally, the coding scheme for FCA matching warnings, text position and font size were further refined to enhance the reliability of the methodology.
	Risk disclosures	Coders searched specific areas (app store description, sign-up screen, main menu, main tabs) and relevant submenus for up to five minutes to find risk disclosure documents. They noted whether accessing these documents required redirection to a web browser and if they could be downloaded for user convenience. If no risk disclosure was found within the app, this was noted as 'not found'.	None
User engagement practices	Email communication	Coders reviewed emails after a seven-day period post sign up. Each email was screen-recorded, sequentially and numbered accordingly. The contents were examined for engagement marketing (e.g., product reminders, celebrity endorsements) and incentive-based marketing (e.g., loyalty programmes, bonuses). Additionally, the presence of risk warnings in these emails was noted, including their position and font size in relation to the surrounding text. If an email contained multiple warnings, each was separately noted.	None

(Continued)

Table 1. *(Continued.)*

Category	Features	Summary	Deviations from OSF
	Push notifications	After recording initial features, coders activated push notifications for all trading apps and waited seven days to review the notification history on assigned phones. Coders documented the daily number of notifications received from each app and the total received over the seven-day period. For apps sending no notifications within the period, 'no notifications' was recorded across relevant columns	None

based on the criteria set in the codebook. The analysis revealed percentage agreements ranging from 85% to 100% across all variables in the above table, demonstrating an adequate level of agreement.

Thematic analysis

Dataset generation

Each app offered more educational content than could be feasibly analysed by the research team. Two apps were excluded from this sample, as one did not allow access to educational materials through a 'demo' account, and another only offered informational videos, not meeting the strategic criteria essential for this study. Consequently, two team members catalogued every educational resource, categorising them into (1) 'informational' (i.e., content related to trading terminology, investment product information and app use); (2) 'strategic' (i.e., content related to 'how to' trade including, analysis, decision making, risk managements and others); or (3) 'other' for resources that did not clearly fit into the first two categories or overlapped them. The principal researcher revised and provided feedback on the final classification. Initially, the researchers planned to randomly select one educational material from each category per app (i.e., 'informational', 'strategic' and 'other'). However, the diversity and breadth of the materials led to a decision to focus exclusively on the 'strategic' category. Given the primary aim of this study to explore the practical learning experiences provided to demo account users on how to trade, the strategic category was found to be the most relevant to how trading apps equip their users with the necessary knowledge to make trading decisions.

Up to three strategic resources were then randomly selected for each app. Two apps had extremely long materials (approximately 30,000 words across the three resources), so only one resource was selected for each of these two apps. To ensure comparability across apps, this one resource was selected from the original three randomly selected materials based on their word count, meaning the closest to the average word count of the strategic resources in the other apps was selected. This approach resulted in a final

sample of 31 educational materials across 12 apps (65,833 words overall). During the familiarization phase of the analysis, this sample size was deemed adequate to provide meaningful insights into the educational resources offered to demo account users, in line with qualitative methodologists' recommendations (Malterud *et al.*, 2016).

Analytic process

The data were analysed using thematic analysis, and followed the six steps proposed by Braun and Clarke (2006). During the first step – familiarisation – the principal researcher first read the data while taking note of interesting patterns using an inductive approach. Initial observations were noted and discussed with a second researcher. The process of familiarisation with the data was essential for data immersion, and the formation of initial insights. The coding process started with an open coding approach allowing data segmentation without predefined categories.

The popular qualitative analysis tool NVivo was used to maintain organization of the large dataset, which allowed for more efficient navigation through the codes. The data were then re-read and coded using a deductive approach, as related theory was taken into consideration. To ensure an unbiased coding process in the second step of the analysis, the principal researcher conducted multiple coding rounds and collaborated closely with the second researcher, who reviewed the coding systematically. The two researchers held regular discussions to review and refine the codes. These two main researchers were relatively inexperienced in investing and trading research, allowing for the data to be approached from the view of an 'inexperienced trader'. To develop the initial themes and sub-themes in the third step, the relationship between the codes was examined to identify patterns. The process of grouping the codes into themes and sub-themes was primarily deductive and theory driven. Collaboration played a significant role during step four, where the initial themes were reviewed. Two additional researchers, with extensive expertise in financial investing and trading, provided essential review and validation of the themes. In the fifth step, the refinement and naming of the final themes comprised several steps including (1) revision of the data and coding process, allowing for any necessary adjustments; (2) collaborative refinement, which was greatly enhanced through several discussions between all four collaborators; and (3) peer debrief, with feedback from collaborators being systematically integrated into the process. Finally, in the sixth and final step, the principal researcher drafted the analysis, and all collaborators reviewed and revised its contents.

Results

Content analysis of consumer protection features and user engagement practices.

Analysis of all risk warnings revealed that the percentage of losing accounts across all apps ranged from 65.3% to 89.0% (M = 75.3%, S.D. = 6.2). Overall, 13 of the 14 apps (92.5%) had at least one risk warning in their respective app store descriptions during app download. Results of the analysis of the apps' user interfaces (see Table 2) showed that none of the 14 apps had warnings present across all three of the locations assessed. Two apps (14.3%) had no warnings present in any of the locations. Half of the apps (*n* = 7) had risk warnings in only one location, either in submenus (*n* = 3), sign-up

Table 2. Location of risk warnings across all apps

Risk warnings found	0 Places		1 Place		2 Places		3 Places	
	n	%	*n*	%	*n*	%	*n*	%
Number of apps (*N* = 14)	2	14.3	7	50.0	5	35.7	0	0.0
Locations of risk warnings	(*n* = 0)		(*n* = 7)		(*n* = 5)		(*n* = 0)	
Sign-up screen	–	–	2	28.5	–	–	–	–
Main tab	–	–	2	28.5	–	–	–	–
Submenu	–	–	3	42.8	–	–	–	–
Sign-up screen & Main tab	–	–	–	–	1	20.0	–	–
Main tab & Submenu	–	–	–	–	2	40.0	–	–
Sign-up screen & Submenu	–	–	–	–	2	40.0	–	–

Note: Main Tabs refers to the primary navigation tabs within the app, requiring one click to access.
Submenu refers to secondary menu options within the app, requiring an average of 4 clicks to access.
Some totals may not sum to 100 due to rounding.

screen (*n* = 2) and main tabs (*n* = 2). Across all apps, warnings found in submenus were more difficult to access than those in the main tabs, taking an average of four clicks to find. Only five apps (35.7%) had risk warnings in two locations. For two of these apps, warnings were found in the main tab and submenus, for another two apps warnings were found in the sign-up screens and submenus and for one app warnings were found in the sign-up screen and main tabs. Therefore, only 5 out of 14 apps (35.7%) had risk warnings in the main tabs, which could be considered the easiest location for users to find them in.

In total, 57 risk warnings were found across all 14 apps (see Table 3). Eighteen (31.6%) did not comply with FCA standards for failing to report the percentage of accounts that lost money. Moreover, these 18 warnings varied greatly in length and style format, with all mentioning the risks associated with trading (see Table 4). Six warnings (10.5%) partially matched FCA guidelines, meaning one or more required sentences were missing (i.e., *[CFDs are complex instruments and come with a high risk of losing money rapidly due to leverage]* '65.3% of retail investor accounts lose money when trading spread bets and CFDs. You should consider whether you understand how spread bets and CFDs work and whether you can afford to take the high risk of losing your money'). Thirty-three warnings (57.9%) adhered to the standard FCA format.

Regarding risk warnings' positioning on the screen, over half of warnings (57.9%, *n* = 33) occupied the bottom position, meaning users had to scroll to the bottom of the page to find it. Twenty-one risk warnings (36.8%) were found at the top of the page. In 5.3% of cases (*n* = 3), risk warnings were found in a central position. Fifteen of the 57 risk warnings (26.3%) had a smaller font size compared to the surrounding text. Thirty-eight warnings (66.7%) had the same font size, while only 4 of the 57 warnings (7.0%) had a larger font size. Finally, 14 risk warnings (24.6%) could only be seen once the user was redirected to the broker's external website through a browser. Overall, risk warnings were frequently small, difficult to see and placed in varying, often obscured locations, which could lead users to not seeing this information.

Table 3. Characteristics of risk warnings

Features	All risk warnings (*N* = 57)	
	n	%
FCA format		
Yes	33	57.9
No	18	31.6
Partial match	6	10.5
Warning position		
Top	21	36.8
Central	3	5.3
Bottom	33	57.9
Warning size		
Smaller	15	26.3
Same	38	66.7
Bigger	4	7.0
Linked to website		
Yes	14	24.6
No	43	75.4

Table 4. Risk warnings that did not comply with FCA rules

Non-compliant risk warnings (*N* = 18)	
Text	Number of times it appeared
Trading CFDs on margin carries a high level of risk, and may not be suitable for all investors.	2
Trading Forex/CFDs on margin carries a high level of risk and may not be suitable for all investors. The products are intended for retail, professional, and eligible counterparty clients. Retail clients who maintain account(s) with [anonymized] could sustain a total loss of deposited funds but are not subject to subsequent payment obligations beyond the deposited funds but professional clients and eligible counterparty clients could sustain losses in excess of deposits (..).	3
The risk of loss in online trading of stocks, options, futures, forex, foreign equities, and fixed income can be substantial. Before trading, clients must read the relevant risk disclosure statements on [anonymized] Warnings and Disclosures page.	1
Investing in financial products involves taking risk. Your investments may increase or decrease in value, and losses may exceed the value of your original investment.	2
The risk of loss in online trading of stocks, options, futures, forex, foreign equities, and fixed income can be substantial. Options are not suitable for all investors. For more information read the 'Characteristics and Risks of Standardized Options.'	1

(*Continued*)

Table 4. (*Continued.*)

Non-compliant risk warnings ($N = 18$)	
Text	Number of times it appeared
The risk of loss in online trading of stocks, options, futures, forex, foreign equities, and fixed income can be substantial.	1
Leveraged trading in foreign currency contracts or other off-exchange products on margin carries a high level of risk and may not be suitable for everyone. We advise you to carefully consider whether trading is appropriate for you in light of your personal circumstances. You may lose more than you invest (..).	2
Derivatives including Margin FX and CFDs are considered speculative and are highly leveraged. They carry significantly greater risks than non geared investments. Trading derivatives involves the risk of losing substantially more than your initial investment (..).	1
Trading contracts for Difference (CFDs) carries a high level of risk and may not be suitable for all investors. The use of leverage in CFD trading can magnify both potential gains and losses, and as a result, you may lose more than your original capital. It is important to fully understand and acknowledge the associated risks before engaging in CFD trading (..).	1
Your Capital is at Risk	2
All trading involves risk. Only risk capital you're prepared to lose.	1
All trading involves risk.	1

Note: Some risk warnings listed above are abbreviated. The full text can be accessed at https://osf.io/s5qdt/?view_only=fd5d5bfc05624252bd75a5ac4797ef88.

Table 5. Presence of risk disclosures across all apps

	All apps ($N = 14$)	
Features	*n*	%
Risk disclosures		
Found	10	71.4
Not found	4	28.6

Table 5 summarises the presence of risk disclosures, which are longer and detailed documents usually found in one specific location. Results show that 10 out of the 14 apps (71.4%) made risk disclosures available. However, of the 10 disclosures found, only 4 were located within the apps' user interfaces. Six disclosures were linked to the platform's external website (see Table 6), meaning users were redirected to an external browser. Finally, two disclosures could not be downloaded directly to the mobile phones, whereas eight could.

Analysis of emails and push notifications showed that the majority of apps communicated frequently with demo account users (see Table 7). Ten of the 14 apps (71.4%) sent emails during the seven days post sign-up; only 4 (28.6%) did not. Additionally, eight apps (57.1%) sent push notifications, whereas six (42.9%) did not. In total, 77 emails and 60 notifications were received. The characteristics of the 77 emails received can be found in Table 8. Seventy-four (96.1%) emails included engagement marketing.

Table 6. Characteristics of risk disclosures

	All risk disclosures ($N = 10$)	
Features	*n*	%
Available to download		
Yes	8	80.0
No	2	20.0
Linked to website		
Yes	6	60.0
No	4	40.0

Table 7. Presence of email communications and notifications across all apps

	All apps ($N = 14$)	
Features	*n*	%
Email communication		
Found	10	71.4
Not found	4	28.6
Notifications		
Found	8	57.1
Not found	6	42.9

Only three emails (3.9%) contained incentive-based marketing, providing some financial inducement for users to sign-up for a real trading account. Moreover, of the 101 risk warnings found across the 77 emails, only four (4.0%) were positioned at the top of the page. Over half of the warnings (56.4%, $n = 57$) were found at the bottom of the email. Forty warnings (39.6%) were found in a central position within the main body of the email. Finally, 76 of the 101 warnings (75.2%) had a smaller font size than the main text. Twenty-five (24.8%) had the same font size, and none had a bigger text size.

Educational content gives users the hope of winning

The risk warnings examined in the previous content analysis showed that a majority of users lose money when trading for real money with these apps. However, educational resources might give users hope that they can be in the minority of winners. In this qualitative thematic analysis, we show that educational resources contributed to this hope of winning by emphasising various strategic and psychological factors. Quotes referenced by their code only can be found at https://osf.io/s5qdt/.

Strategic factors

Random luck is the predominant factor underlying the profitability of high-risk speculative trading using CFDs. However, many apps' educational resources focused instead on various strategic factors. For instance, one app stated, 'Traders who win consistently

Table 8. Characteristics of email communications

Features	All Email communications (N = 77)	
	n	%
Marketing type		
Engagement marketing	74	96.1
Incentive-based marketing	3	3.9
Risk warning presence		
Found	64	83.1
Not Found	13	16.9
Risk warning text position	(n = 101)[a]	(n = 101)
Top	4	4.0
Central	40	39.6
Bottom	57	56.4
Risk warning text size		
Smaller	76	75.2
Same	25	24.8
Bigger	0	0.0

Note: [a]'*n*' increase to 101 is due to several of the 77 emails containing multiple risk warnings.

treat trading as a business. While there is no guarantee that you will make money, developing a trading plan is crucial if you want to become consistently successful and thrive in the trading game' (A5.1).

Trading apps consistently pointed to demo accounts as key to building experience and confidence before trading on a live account (A7.2; A9.2; A12.1; A12.3):

"If you're uncomfortable with the idea of losing so much of your capital, you may want to reconsider if this is the right time to start trading. You can also practise your trading strategies with our demo account until you feel more comfortable and confident." (A2.1).

"With brokers like [anonymised] you can even open a demo or practice account to learn with… Becoming familiar with the trading platform is essential so that you become comfortable trading on it later with a live account" (A1.2).

"A demo account is an ideal way to practice investing in a risk-free environment. Demo accounts allow you to test your strategies using virtual funds" (A4.2).

Educational content also emphasised the need for continuous practice and skill building (A4.1; A4.2; A5.1):

"In your first 50 trades you might have 40 losing trades and 10 winners. Then in your next 50 trades then you might have 25 losing trades and 25 winners. So, it takes time and practice because you're building all your skills" (A3.1).

"And to be honest, most traders do mishandle this part. Instead of preparing in advance and learning how trading works, many just go all in before they understand, for example, how the markets work, or they end up risk losing money they can barely afford to lose in the first place" (A8.3).

These are common-sense intuitions which fit with learning many normal skills, such as learning to ride a bicycle. However, they are not valid for chance-based gambling games and analogous 'gamblified' speculative financial products.

Educational resources often recommended more specific trading strategies and approaches, which have a range of specialist names. Trading strategies were also often positioned as means for users to improve their chances of success, which could lead to a sense of predictability and control (A7.2; A8.1; A10.1; A11.1; A11.3; A12.1):

"Trend trading is a tried-and-tested strategy that can be made as simple or as complex as you like. It can be used by beginners, intermediate and advanced traders, but only after conducting significant research on how to use it safely and effectively" (A4.1).

"And we do have at the moment what's known as dark cloud cover when it comes to candlestick charting. It can be a short to medium term reversal pattern" (A8.1).

"The hanging man often appears at the top of an uptrend. What you can often see is a very long shadow where there has been additional selling pressure where it's aggressively targeting the downside, but it's been pushed higher by the bulls" (A7.2).

"Remember, no single indicator can guarantee success, but by combining different tools and approaches, traders can increase their chances of achieving consistent profitability" (A6.1).

The myriad of strategies and approaches mentioned in the educational resources could be seen as giving investors hope that with the right approach that they too might become profitable traders. If the risk warnings worked correctly, then any losing CFD investor should realise that these investments lead to losses for most investors. However, the educational resources could contrastingly give investors hope, that only by applying the right strategy, that they too might be able to attain high profits.

Psychological factors

The educational materials often emphasised that a strategy can only be profitable if it is executed correctly, with investors needing to for example know when to follow a market trend's momentum, and when to act as a contrarian in anticipation of a change of market direction. Therefore, an investor who is losing money with a certain strategy could be blamed for lacking the fortitude or discipline to execute the strategy correctly:

"Now you'll obviously need some more as a buffer against volatility, though. But above all this stands your personal responsibility. Your broker can't provide that and we can't teach it" (A1.1).

"Keeping calm is important and is helped by only investing an amount of capital you can afford to lose, while holding some cash back in an emergency fund to finance real-world spending" (A4.2).

Users were often advised to maintain emotional resilience, discipline and strategic adherence, always managing their psychological state to achieve trading success, 'Our third tip is to try and overcome your inner greed. You don't need to be a greedy person to experience some levels of that emotion while trading' (A8.3). For instance, one app advises, 'Remember the role that your emotions and personal psychology can play in trading. Trading on a day when you are less than 100% could have negative consequences as trading requires your complete concentration' (A5.1).

"Discover how mastering your emotions and maintaining discipline are key to achieving lasting success in trading" (A3.1).

Psychological factors were made to seem especially relevant during periods of losses Educational content emphasised the need for users to take control of their emotions in order to recover from losses and successfully persevere in their trading journey (A2.1; A3.1):

"As mentioned above, the first step towards recovery [from financial loss] is getting rid of your emotional baggage. Your recovery and future financial success rely on you having a cool and calculated approach" (A4.3).

"It is absolutely normal to feel a sense of grief when suffering from financial loss. Don't be ashamed and don't run away from the feeling. Accept it and take responsibility" (A4.3).

Discussion

Mobile-based trading apps might claim to be the latest in a string of technological innovations that have positively transformed investing, but have also been criticized for 'gamblifying' investing by nudging inexperienced investors toward high-risk investments that mostly lose money (Newall and Weiss-Cohen, 2022). While many of these investors may suffer from low financial literacy (Lusardi and Mitchell, 2014) or overconfidence (Barber and Odean, 2000), we contributed to an understanding of these issues by auditing the 14 most popular UK-based CFD trading apps for various aspects of deceptive choice architecture (Mills, 2024). Consistent with previous findings from gambling (Newall *et al.*, 2022), we found that only a minority of apps (35.7%) displayed risk warnings prominently in their main tabs, with email-based risk warnings rarely appearing in large font in prominent locations. Many risk warnings (31.6%) also failed to follow FCA guidelines by not disclosing the percentage of customers that lost money with the app. In the present study, the majority of trading apps communicated with users via emails and push notifications almost daily. Specifically, over 70% of CFD providers sent marketing emails, and over 50% sent push notifications. Similarly, Hing *et al.* (2019) reported that direct messages (via emails, text messages and phone calls) from wagering operators were among the most frequently encountered

advertisement types by regular bettors. Nearly 94.3% of sports bettors and 92.7% of race bettors reported receiving such direct messages. These notifications promoted betting opportunities or reminding users of ongoing betting activities. Importantly, Hing et al. highlighted that such marketing is considered unavoidable and tends to lead to greater betting engagement. Results on risk disclosures showed that these documents were equally difficult to access, which adds to previously known issues in consumer markets (Bar-Gill, 2013).

The thematic analysis of educational resources revealed some other unique ways that apps might attempt to subvert the risk warnings intended purpose of communicating that most CFD investors lose money. Educational tools could attempt to give users the hope of winning by emphasising practice and trading strategies as relevant strategic factors, while also attributing investors' losing results to a lack of discipline and other related psychological factors. Although some sensible trading may benefit from training and skills to generate small profits in the long-run, CFDs are mostly used in high-risk, leveraged trading, over short time horizons, which are impossible to predict and overwhelmingly likely to lead to losses as reported in the warnings. Many of these themes resonate with findings from a recent study of Instagram day-trading adverts aimed at men (Whybrow *et al.*, 2024). Overall, these findings have various implications for future research and policy in this area.

Our work contributes to the emerging field on deceptive choice architecture, which has been known under various names including dark patterns (Sin *et al.*, 2022; Mills *et al.*, 2023), sludge (Mills *et al.*, 2023; Shahab and Lades, 2024) and dark nudges (Newall, 2019; Pennington *et al.*, 2022; Lewin *et al.*, 2024). This emerging field is subject to a range of emerging terms, of which we have chosen 'deceptive choice architecture' as being one of the most inclusive. However, the field also attempts to account for quite a broad range of choice architect behaviour, which probably accounts for part of this variation in terms, and which also poses methodological challenges going forward. Some research has attempted to quantify choice architect behaviour from different fields within a single unifying framework involving the number of clicks required to complete some goal (Mills *et al.*, 2023). However, while ensuring comparability across apps or websites from quite different consumer domains, this standardized approach might also miss deceptive features that are unique to each domain. The present work's focus on educational content was based on a first-person account written by someone who had experienced harms from spread-betting (Stringman, 2017), which could have been missed by an approach based on other domains of deceptive choice architecture. Gambling research has in recent years been informed by these perspectives from those with lived experience of gambling-related harm (Ortiz *et al.*, 2021), and so this may also be a fruitful approach for further deceptive choice architecture research.

Compared to other recent research on trading app features (Hayes *et al.*, 2022), our research is unique in focusing on demo accounts, which might well attract inexperienced investors. Demo accounts also exist in gambling, but have been subject to little research outside of work which highlighted how they could bias the odds of winning (Abbey and Doukas, 2015; Scibetta, 2019), until policymakers addressed this issue (Gambling Commission, 2021). However, a perspective based on the public health model of gambling harm prevention suggests that even perfectly fair demo accounts may have been overlooked in both investing and gambling. While only a relatively

small proportion of active gamblers might experience high levels of harm at any one time, this appears to be a relatively stable fraction of those who are gambling overall (Room *et al.*, 1999; Rossow, 2019). Therefore, anything which increases overall levels of engagement in gamblified investments might also be expected to increase consequent harms. If enough inexperienced investors sign up for CFD demo accounts, then even if only a minority 'win' money in the trading app and are nudged toward trading for real, then the consequent public health impacts could still be noticeable. Importantly, a number of trading apps have been seen to market themselves prominently through men's professional soccer, and this prominence will be unaffected by forthcoming industry self-regulation on gambling advertising in the UK (Torrance *et al.*, 2023). Further research and policy attention toward demo accounts in both gambling and investing therefore appears warranted.

Risk warnings have thus-far been financial regulators main tool of addressing potential harms from CFDs (Delias *et al.*, 2022; Financial Conduct Authority, 2022). Any information-based approach such as risk warnings has the positive feature that it maintains consumer freedom, while also aiming to prevent harm (Nuffield Council on Bioethics, 2007). However, any effective risk warning needs to both be prominent (which was overall not found to be the case here) and must be tested with relevant consumers to demonstrate effectiveness. Other previous research suggests that current UK risk warnings in gambling are limited in effectiveness, both in terms of generic warnings about gambling's potential harms (Newall *et al.*, 2023a) and when relevant statistical information is communicated (Newall *et al.*, 2020). This suggests that further experimental work is needed to ensure that the content of current CFD warnings is effective at changing the behaviour of at-risk investors. Overconfident investors, for example, may be unlikely to think that a risk warning saying that 89% of relevant investors lose money applies to them, since they overrate their own investing ability. Furthermore, while most of the world's phenomena are auto-correlated (i.e., you can expect a repetition of what happens in the past) and can be learned, short-term individual stock market prices are almost unpredictable, which can be very counterintuitive and much more difficult to learn (Weiss-Cohen *et al.*, 2022). When information-based approaches do not adequately address relevant harms, then other more restrictive approaches toward harm-prevention become justified (Nuffield Council on Bioethics, 2007). With trading apps, this could include placing restrictions on the investments that can be traded, or by reducing the speed or ease with which trades can be made, as follows recent related proposals in gambling (Newall, 2023).

Reflexive account

The thematic analysis in our study was likely influenced by the positionality of our research team, which included experts in gambling and behavioural economics alongside a newcomer to both fields. This diverse expertise enriched our understanding of how trading apps might mirror gambling-like mechanisms, such as deceptive designs and engagement strategies. However, the team members' experience with gambling research could have led to a more critical interpretation of the apps' educational content, potentially emphasizing exploitative features. Team members' experience with behavioural economics might have also biased our analysis towards identifying patterns aligned with economic theories like overconfidence bias. The inclusion of a

team member with no prior experience in these areas provided a valuable outsider perspective, highlighting themes that might otherwise have been overlooked and promoting alternative interpretations. To mitigate bias and enhance the transparency of our analysis, we implemented rigorous strategies including regular peer debriefing sessions, where team members critically assessed each other's interpretations and debated alternative viewpoints. We also employed an iterative coding process, repeatedly revisiting and revising our data to capture new insights. These reflexive methods helped ensure a balanced and comprehensive understanding of the educational content in the apps, reflecting a robust analysis despite the potential influence of our diverse backgrounds.

Limitations

While our study provides valuable insights into the consumer protection features, user engagement practices and educational content of CFD trading apps, several limitations should be acknowledged. The sample used was representative of the most popular platforms in the UK, but the 14 apps analysed may not capture the full spectrum of practices across other types of investment. Future research should expand this sample to include a wider variety of apps, including those with smaller user bases. Furthermore, the analysis was centred around demo accounts, which may overlook the user experiences and educational materials provided to live account users. Moreover, it is important to acknowledge that some trading platforms are also regulated by authorities in other countries, which may have resulted in some of the risk warnings having different formats than the ones required by the FCA. However, given that these platforms are available to UK consumers, FCA rules should still apply. Although thematic analysis is a widely used qualitative research approach, some researchers from other methodological backgrounds may question the degree of subjectivity involved in theme detection and naming. This approach could be complemented by other ways of analysing text data, such as natural language processing. Finally, the study did not directly measure user outcomes or behaviours following exposure to the apps' designs and engagement practices. Therefore, while the potential impacts can be inferred based on the content and placement of risk warnings and educational messages, actual user responses and financial outcomes remain unexplored. Studies using eye-tracking might for example be best placed to assess the extent to which investors do or do not see these risk warnings. Experimental designs (including naturalistic randomized controlled trials) would also be beneficial in establishing causal relationships between various app features and user behaviour.

Conclusions

In conclusion, this study aimed to contribute to an understanding of why people might invest in something that they are explicitly told they should expect to lose money from. Any complete answer to this question is likely to reveal multiple contributing factors. Just within the domain of deceptive choice architecture, we showed within demo CFD trading accounts how the lack of visibility and correct wording of risk warnings, the lack of easy access to risk disclosures, the frequent communication via emails and push notifications and educational resources' content may all contribute to someday

answering this question. Overall, this shows the variability and complexity inherent in deceptive choice architecture, and the need to continue monitoring and assessing these features of the modern world as a part of behavioural public policy research.

References

Abbey, B. S. and J. A. Doukas (2015), 'Do individual currency traders make money?', *Journal of International Money and Finance*, **56**: 158–177.

The Advertising Standards Authority. (2010a), *The BCAP Code—The UK code of Broadcast Advertising* (p.rule 17.3.3). https://www.asa.org.uk/static/846f25eb-f474-47c1-ab3ff571e3db5910/BCAP-Code-full.pdf (Accessed by 7 January 2024).

The Advertising Standards Authority. (2010b), *The CAP Code—The UK Code of Non-broadcast Advertising and Direct & Promotional Marketing* (p.rule16.3.4). https://www.asa.org.uk/static/47eb51e7-028d-4509-ab3c0f4822c9a3c4/The-Cap-code.pdf (Accessed by 7 January 2024).

Allami, Y., D. C. Hodgins, M. Young, N. Brunelle, S. Currie, M. Dufour, M.-C. Flores-Pajot and L. Nadeau (2021), 'A meta-analysis of problem gambling risk factors in the general adult population', *Addiction*, **116**(11): 2968–2977.

Arnold, M., M. Pelster and M. G. Subrahmanyam (2022), 'Attention triggers and investors' risk-taking', *Journal of Financial Economics*, **143**(2): 846–875.

Barber, B. M. and T. Odean (2000), 'Trading is hazardous to your wealth: the common stock investment performance of individual investors', *The Journal of Finance*, **55**(2): 773–806.

Barber, B. M. and T. Odean (2001), 'Boys will be boys: gender, overconfidence, and common stock investment', *The Quarterly Journal of Economics*, **116**(1): 261–292.

Bar-Gill, O. (2013), Seduction by contract: law, economics, and psychology in consumer markets (1. publ. in paperback 2013). Oxford Univ. Press.

Bauer, R., M. Cosemans and P. Eichholtz (2009), 'Option trading and individual investor performance', *Journal of Banking & Finance*, **33**(4): 731–746.

Behavioural Insights Team (2022), 'Behavioural risk audit of gambling operator platforms', *Retrieved December*, **4**: 2023.

Belk, R. W., and R. Llamas (Eds) (2013), 'Stock trading in the digital age: speed, agency and the entrepreneurial consumer', in *The Routledge Companion to Digital Consumption*, New York: Routledge, 226–240.

Blaszczynski, A., R. Ladouceur and H. J. Shaffer (2004), 'A science-based framework for responsible gambling: the Reno model', *Journal of Gambling Studies*, **20**(3): 301–317. Scopus.

Bradley, A. and R. J. E. James (2021), 'Defining the key issues discussed by problematic gamblers on web-based forums: a data-driven approach', *International Gambling Studies*, **21**(1): 59–73.

Braun, V. and V. Clarke (2006), 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, **3**(2): 77–101.

Brown, C., J. Dark and K. Davis (2010), 'Exchange traded contracts for difference: design, pricing, and effects', *Journal of Futures Markets*, **30**(12): 1108–1149.

Browne, M. and M. J. Rockloff (2020), 'Measuring behavioural dependence in gambling: a case for removing harmful consequences from the assessment of problem gambling pathology', *Journal of Gambling Studies*, **36**(4): 1027–1044.

Burson, K. A., R. P. Larrick and J. Klayman (2006), 'Skilled or unskilled, but still unaware of it: how perceptions of difficulty drive miscalibration in relative comparisons', *Journal of Personality and Social Psychology*, **90**(1): 60–77.

Capelle-Blancard, G. (2010), 'Are derivatives dangerous? A literature survey', *International Economics*, **123**: 67–89.

Carlson, B. (2021, February 7). Some Friendly Reminders About Day Trading—A Wealth of Common Sense. https://awealthofcommonsense.com/2021/02/some-friendly-reminders-about-day-trading/

Chague, F., R. De-Losso and B. Giovannetti (2019), 'Day Trading for a Living?', *SSRN Electronic Journal*.

Delias, D., F. Farghly, L. Hayes, C. Ng and M. Spohn (2022), 'Going beyond 'capital at risk': behaviourally informed risk warnings for high-risk investment products', *Financial Conduct Authority*, 3–33.

Doering, P., S. Neumann, and S. Paul (2015). A primer on social trading networks – institutional aspects and empirical evidence. *Advanced Risk & Portfolio Management® Research Paper Series*. https://api.semanticscholar.org/CorpusID:59436124 (Accessed by 7 January 2024).

Dorfleitner, G. and I. Scheckenbach (2022), 'Trading activity on social trading platforms – a behavioral approach*', *The Journal of Risk Finance*, **23**(1): 32–54.

Dorn, D. and P. Sengmueller (2009), 'Trading as entertainment?', *Management Science*, **55**(4): 591–603.

Engelberg, J. E., A. V. Reed and M. C. Ringgenberg (2018), 'Short-selling risk', *The Journal of Finance*, **73**(2): 755–786.

European Securities and Markets Authority (2018), '*European securities and markets authority decision (EU) 2018/796 of 22 May 2018 to temporarily restrict contracts for differences in the union in accordance with Article 40 of regulation (EU) No 600/2014 of the European parliament and of the council*', Official Journal of the European Union, https://eur-lex.europa.eu/eli/dec/2018/796/oj

European Securities and Markets Authority. (2019), *Notice of ESMA's Product Intervention Renewal Decision in relation to contracts for differences*. https://www.esma.europa.eu/sites/default/files/library/esma35-43-1912_cfd_renewal_3_-_notice_en.pdf

Financial Conduct Authority. (2016), *Consultation Paper CP16/40: enhancing conduct of business rules for firms providing contract for difference products to retail clients*. Financial Conduct Authority. https://www.fca.org.uk/publication/consultation/cp16-40.pdf (Accessed by 7 January 2024).

Financial Conduct Authority. (2018, January 10), *Providers and distributors of contracts for difference (CFD) products: Resolving failings which may cause significant consumer harm*. https://www.fca.org.uk/publication/correspondence/dear-ceo-letter-cfd-review-findings.pdf

Financial Conduct Authority. (2022, January 18), *PS22/10: Strengthening our financial promotion rules for high-risk investments and firms approving financial promotions*. FCA. https://www.fca.org.uk/publications/policy-statements/ps22-10-strengthening-our-financial-promotion-rules-high-risk-investments-firms-approving-financial-promotions (Accessed by 7 January 2024).

Financial Conduct Authority. (2024), *PERG 8—Financial Promotion and related activities*. https://www.handbook.fca.org.uk/handbook/PERG.pdf (Accessed by 7 January 2024).

Financial Conduct Authority. (n.d.). *COBS Conduct of Business Sourcebook*. https://www.handbook.fca.org.uk/handbook/COBS/ [2 May 2024].

Fortier, M.-È., S. Audette-Chapdelaine, A.-M. Auger and M. Brodeur (2024), 'Nudge theory and gambling: a scoping review', *Frontiers in Public Health*, **12**: 1377183.

Foster, F. D., A. D. Lee and W. M. Liu (2019), 'CFDs, forwards, futures and the cost-of-carry', *Pacific-Basin Finance Journal*, **54**: 183–198.

Gambling Commission. (2021), *Remote gambling and software technical standards (RTS)*. https://www.gamblingcommission.gov.uk/print/remote-gambling-and-software-technical-standards (Accessed by 7 January 2024).

Gargano, A., J. Sotes-Paladino and P. Verwijmeren (2018), *The profits and losses of short sellers*. Working paper, University of Melbourne.

Gathergood, J., C. Gilchrist, L. Hayes, D. Karapetyan, S. O'Neill, and N. Stewart (2024). *Digital engagement practices: A trading apps experiment*. https://www.fca.org.uk/publication/research-notes/research-note-digital-engagement-practices-trading-apps-experiment.pdf (Accessed by 7 January 2024).

Grall-Bronnec, M., A. Sauvaget, C. Boutin, S. Bulteau, S. Jiménez-Murcia, F. Fernández-Aranda, G. Challet-Bouju and J. Caillon (2017), 'Excessive trading, a gambling disorder in its own right? A case study on a French disordered gamblers cohort', *Addictive Behaviors*, **64**: 340–348.

Granero, R., S. Tárrega, F. Fernández-Aranda, N. Aymamí, M. Gómez-Peña, L. Moragas, N. Custal, L. Orekhova, L. G. Savvidou, J. M. Menchón and S. Jiménez-Murcia (2012), 'Gambling on the stock market: an unexplored issue', *Comprehensive Psychiatry*, **53**(6): 666–673.

Grinblatt, M. and M. Keloharju (2009), 'Sensation seeking, overconfidence, and trading activity', *The Journal of Finance*, **64**(2): 549–578.

Haven, T. and L. Van Grootel (2019), 'Preregistering qualitative research', *Accountability in Research*, **26**(3): 229–244.

Hayes, L., S. O'Neil, M. Spohn, and C. Ng (2022), *Gaming Trading: How Trading Apps Could Be Engaging Consumers for the Worse*, FCA. https://www.fca.org.uk/publications/research-articles/gaming-trading-how-trading-apps-could-be-engaging-consumers-worse (Accessed by 7 January 2024).

Heimer, R. and A. Simsek (2019), 'Should retail investors' leverage be limited?', *Journal of Financial Economics*, **132**(3): 1–21.

Hing, N., A. M. T. Russell, A. Thomas and R. Jenkinson (2019), 'Wagering advertisements and inducements: exposure and perceived influence on betting behaviour', *Journal of Gambling Studies*, **35**(3): 793–811.

James, R. J. E., G. Dixon, M.-G. Dragomir, E. Thirlwell and L. Hitcham (2023), 'Understanding the construction of 'behavior' in smartphone addiction: a scoping review', *Addictive Behaviors*, **137**: 107503.

Lakonishok, J., I. Lee, N. D. Pearson and A. M. Poteshman (2007), 'Option market activity', *Review of Financial Studies*, **20**(3): 813–857.

Lewin, J., M. Field and E. Davies (2024), 'Investigating the impact of 'dark nudges' on drinking intentions: a between groups, randomized and online experimental study', *British Journal of Health Psychology*, **29**(1): 272–292.

Lusardi, A. and O. S. Mitchell (2014), 'The economic importance of financial literacy: theory and evidence', *Journal of Economic Literature*, **52**(1): 5–44.

Major, K. (2023, May 3). Trading platforms sell the dream of making big money fast. The reality can be far more brutal. *The Guardian*. https://www.theguardian.com/commentisfree/2023/may/03/trading-platforms-money-wages-financial-products-online (Accessed by 7 January 2024).

Malterud, K., V. D. Siersma and A. D. Guassora (2016), 'Sample size in qualitative interview studies: guided by information power', *Qualitative Health Research*, **26**(13): 1753–1760.

Mills, S. (2024), 'Deceptive choice architecture and behavioral audits: a principles-based approach', *Regulation & Governance*, rego.12590.

Mills, S., R. Whittle, R. Ahmed, T. Walsh and M. Wessel (2023), 'Dark patterns and sludge audits: an integrated approach', *Behavioural Public Policy*, 1–27.

Mukaram and I. S. Sarah (2018), Online stock trading learning through real bank account. In *Proceedings of the International Conference on Education and Technology (ICET 2018)*. Proceedings of the International Conference on Education and Technology (ICET 2018), Malang, Indonesia.

Newall, P. W. S. (2019), 'Dark nudges in gambling', *Addiction Research & Theory*, **27**(2): 65–67.

Newall, P. W. S. (2023), 'Reduce the speed and ease of online gambling in order to prevent harm', *Addiction*, **118**(2): 204–205.

Newall, P. W. S., T. Hayes, H. Singmann, L. Weiss-Cohen, E. A. Ludvig and L. Walasek (2023a), 'Evaluation of the 'take time to think' safer gambling message: a randomised, online experimental study', *Behavioural Public Policy*, 1–18.

Newall, P. W. S., L. Walasek, A. Hassanniakalager, A. M. T. Russell, E. A. Ludvig and M. Browne (2023b), 'Statistical risk warnings in gambling', *Behavioural Public Policy*, **7**(2): 219–239.

Newall, P. W. S., L. Walasek and E. A. Ludvig (2020), 'Equivalent gambling warning labels are perceived differently', *Addiction*, **115**(9): 1762–1767.

Newall, P. W. S., L. Walasek, E. A. Ludvig and M. J. Rockloff (2022), 'Nudge versus sludge in gambling warning labels: how the effectiveness of a consumer protection measure can be undermined', *Behavioral Science*, **8**(1).

Newall, P. W. S. and L. Weiss-Cohen (2022), 'The gamblification of investing: how a new generation of investors is being born to lose', *International Journal of Environmental Research & Public Health*, **19**(9): 5391.

Nosić, A. and M. Weber (2010), 'How riskily do I invest? The role of risk attitudes, risk perceptions, and overconfidence', *Decision Analysis*, **7**(3): 282–301.

Nuffield Council on Bioethics (2007), *Public Health: Ethical Issues*, Nuffield Council on Bioethics.

Oehler, A. and J. Schneider (2022), 'Gambling with lottery stocks?', *Journal of Asset Management*, **23**(6): 477–503.

Ortiz, V., R. Cain, S. W. Formica, R. Bishop, H. Hernández and L. Lama (2021), 'Our voices matter: using lived experience to promote equity in problem gambling prevention', *Current Addiction Reports*, **8**(2): 255–262.

Parke, A., A. Harris, J. Parke, J. Rigbye and A. Blaszczynski (2015), 'Responsible marketing and advertising in gambling: a critical review', *The Journal of Gambling Business and Economics*, **8**(3): 21–35.

Pennington, C. R., R. L. Monk, A. W. Qureshi, R. Kulkarni, W. Li, J. Li and D. Heim (2022), 'Dark nudges: branding magnifies the decoy effect in alcohol purchasing decisions', *Journal of Studies on Alcohol and Drugs*, **83**(6): 857–866.

Petar, P. (2021), 'Analyzing CFD retail investors' performance in a post MIFID II environment', *Economic Studies Journal*, **4**: 53–73.

Rawat, V., N. Hing and A. M. T. Russell (2020), 'What's the message? A content analysis of emails and texts received from wagering operators during sports and racing events', *Journal of Gambling Studies*, **36**(4): 1107–1121.

Room, R., N. E. Turner and A. A. Ialomiteanu (1999), 'Community effects of the opening of the Niagara casino', *Addiction*, **94**: 1449–1466.

Rossow, I. (2019), 'The total consumption model applied to gambling: empirical validity and implications for gambling policy', *NAD Nordic Studies on Alcohol and Drugs*, **36**(2): 66–76.

Russell, A. M. T., N. Hing, M. Browne and V. Rawat (2018), 'Are direct messages (texts and emails) from wagering operators associated with betting intention and behavior? An ecological momentary assessment study', *Journal of Behavioral Addictions*, **7**(4): 1079–1090.

Schüll, N. D. (2014), *Addiction by Design: Machine Gambling in Las Vegas*, New York: Princeton University Press.

Scibetta, C. C. (2019), 'Window theory for Forex', *Journal of Finance and Investment Analysis*, **8**(3): 1–2.

Shahab, S. and L. K. Lades (2024), 'Sludge and transaction costs', *Behavioural Public Policy*, **8**(2): 327–348.

Sin, R., T. Harris, S. Nilsson and T. Beck (2022), 'Dark patterns in online shopping: do they work and can nudges help mitigate impulse buying?', *Behavioural Public Policy*, 1–27.

Stemler, S. E., and J. Tsai (2008), 'Best practices in interrater reliability three common approaches', in J. Tsai and J. Osborne (eds), *Best Practices in Quantitative Methods*, California, USA: Sage Publications, 29–49.

Stewart, E. (2021, July 29). *Is Robinhood the next meme stock?* Vox. https://www.vox.com/recode/22599985/robinhood-ipo-stock-symbol-hood

Stringman, C. (2017), *Win, Lose, Repeat: My Life as a Gambler, from Coin-pushers to Spread-betting*, Great Britain: Ortus Press, an imprint of Free Association Books.

Subrahmanyam, A., K. Tang, J. Wang and X. Yang (2024), 'Leverage is a double-edged sword', *The Journal of Finance*, **79**(2): 1579–1634.

Torrance, J., C. Heath, M. Andrade and P. Newall (2023), 'Gambling, cryptocurrency, and financial trading app marketing in English Premier League football: a frequency analysis of in-game logos', *Journal of Behavioral Addictions*, **12**(4): 972–982.

Turner, N. E. (2011), 'The addictiveness of online brokerage services: a first person account', *J Gambl, 2011, 25*.

Weiss-Cohen, L., P. W. S. Newall and P. Ayton (2022), 'Persistence is futile: chasing of past performance in repeated investment choices', *Journal of Experimental Psychology: Applied*, **28**(2): 341–359.

Whybrow, A., M. Andrade, J. Torrance and P. W. S. Newall (2024), '"Are you struggling to keep it up?": problematic content in day-trading adverts targeted at men on Instagram'.