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FULL-LENGTH REPORT

Compulsive buying gradually increased during the first six months of the Covid-19 outbreak

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ABSTRACT

Background and aims: The current Covid-19 situation offers a natural experiment to explore the effect of a chronic stressor on compulsive buying tendencies over an extended period of time. *Design:* Survey method of sampling every three days a new cohort during the first six months of the Covid-19 pandemic (March-October 2020) in the United States. *Participants:* Total (clean) sample of $N = 1{,}430$ (39.3% female, mean age = 36.4 years). *Measurements:* Online and offline compulsive buying separately, distress, economic position, income and age were assessed. *Findings:* Both online and offline compulsive buying increased during the data collection period ($\tau = 0.24$, $\tau = 0.22$, respectively, both $P < 0.001$). Individuals with self-reported high economic position (EP) reported the highest tendency for compulsive buying throughout the entire time frame, although the increase in compulsive buying tendencies over time was the most pronounced among the economically less privileged. Online compulsive buying increased after the CARES Act (first stimulus package) by an effect size of $d = 0.33$. When entered into a regression model, EP had the strongest effect on compulsive buying after accounting for the effect of distress, income and age. The high-EP group reported the strongest correlation between distress and compulsive buying ($r = 0.67$, $P < 0.001$, 95% CI: 0.57–0.76). *Conclusions:* Compulsive buying tendency gradually increased during the first six months of the Covid-19 pandemic especially after the CARES Act.

KEYWORDS

chronic distress, SARS-CoV-2 pandemic, addiction, shopping addiction, compulsive buying-shopping disorder, socioeconomic status, economic position

INTRODUCTION

The current Covid-19 situation provides a unique opportunity for behavioural addiction researchers to gain insight into the effects of chronic stress on shopping in a natural experiment setting. Although publicly available sales reports usually communicate that retail substantially increased due to the pandemic[1], it is not certain whether the sharp increase in purchasing in this period is due to internal factors (e.g., a coping mechanism in response to heightened distress) or external factors (e.g., increased availability of money for shopping due to restrictions on travel and socialising).

In one of the first comprehensive phenomenological descriptions of compulsive buying (CB) O'Guinn and Faber (1989) consider buyers compulsive when they are unable to control their impulse to buy, which pervades their lives and sometimes results in severe consequences. Compulsive buyers typically have unmanageable amounts of debt, which create economic and emotional problems for themselves and for their families. Thus compulsive buying is more than excessive spending, it is viewed as a repetitive, uncontrollable behaviour, typically triggered by negative emotional states, where short-term positive rewards reinforce

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[1]https://unctad.org/news/global-e-commerce-jumps-267-trillion-covid-19-boosts-online-sales.

the behaviour resulting in delayed negative consequences (O'Guinn & Faber, 1989). Such rewarding behaviour can be completing a purchase, which was likely to be the reason for the observed elevated compulsive buying behaviour among survivors of a natural disaster, i.e. the Hurricane Katrina (Sneath, Lacey, & Kennett-Hensel, 2009).

Another natural disaster, the Covid-19 pandemic and the subsequent lockdowns had an unprecedented effect on people's quality of life. The prolonged fear of the disease, the uncertainty, and the unavailability of other, healthier coping strategies e.g., socialising, outdoor activities or group exercise, as well as restrictions on recreational travelling, and considerable reduction in social interactions all impacted well-being. This has resulted in increased and chronic distress, especially for those with a pre-existing mental health condition (Rogers, Shepherd, Garey, & Zvolensky, 2020). There is previous evidence, that those with compulsive buying tendencies are more likely to experience symptoms of anxiety, depression, OCD (Otero-López and Villadefrancos, 2014), and report lower levels of happiness (Villardefrancos & Otero-López, 2016), thus symptoms may become more expressed when under chronic stress. Per definition, excessive behaviours are likely to be a mental and physical way of escaping stressful situations as a way of (maladaptive) coping with distress (Király, Tóth, Urbán, Demetrovics, & Maraz, 2017). Supporting this assumption, the frequency of engaging in addictive activities intended for seeking relief from distress was reported to have increased during lockdowns. For example, researchers reported evidence for increase in porn use (Mestre-Bach, Blycker, & Potenza, 2020), online gaming (King, Delfabbro, Billieux, & Potenza, 2020), smartphone and social media use among schoolchildren (Chen et al., 2021), smoking (Patanavanich & Glantz, 2020) overeating (Di Renzo et al., 2020; Robinson et al., 2021) gambling (Håkansson, Fernández-Aranda, Menchón, Potenza, & Jiménez-Murcia, 2020) alcohol (Chodkiewicz, Talarowska, Miniszewska, Nawrocka, & Bilinski, 2020) and substance use (Czeisler et al., 2020; Rogers et al., 2020) during the pandemic, especially among those who already experienced loss of control over their behaviour before the pandemic. There is evidence, that compulsive buying also increased during the Covid-19 pandemic (Çelik & Köse, 2021; Jaspal, Lopes, & Lopes, 2020; Islam et al., 2021), however, authors typically report retrospective data collection or two-point comparison of CB behaviour in the sample. The only study which collected data regarding CB covered an extended period of seven days at the end of February 2020 in China used experience sampling in 150 individuals and concluded that perceived uncertainty influenced daily impulsive buying behaviour (whereas information overload and anxiety about Covid-19 mediated this relationship) (Xiao, Zhang, & Zhang, 2020).

However, not only internal (such as coping style), but also external factors (such as the availability of financial resources) influence people's decision to buy. Contrary to expectations, however, representative studies typically report that compulsive buyers have a significantly *lower* income at their disposal than non-compulsive buyers as evidenced by data from Germany (Mueller et al., 2010) and from the United States (Koran, Faber, Aboujaoude, Large, & Serpe, 2006). Other studies, however, found no difference in perceived social class in Spain (Otero-López & Villardefrancos, 2014), Denmark (Reisch, Gwozdz, & Raab, 2011) or another study from Germany (Mueller et al., 2011). Consequently, some instruments assess income and overspending as a predictor of compulsive buying, while others explicitly leave out such items (Maraz, Griffiths, & Demetrovics, 2016). Thus, research regarding the relationship between income (social status) and compulsive buying is inconclusive.

The possibility that economic position (EP) and/or income may play a role in the experience of distress and compulsive buying has not been explored to the best of our knowledge. However, there is evidence in other disorders that distress primarily affects those with lower income. For example, income is the strongest (negative) predictor of distress among men (Kessler, 1982). In line with this, unskilled manual worker men are more prone to depression than their skilled counterparts, whereas high-status women appeared to be protected from depression (Kosidou et al., 2011). Based on these findings, it is reasonable to suppose that low-EP individuals will experience greater distress and thus are more prone to short-term rewards in the form of compulsive buying as opposed to more wealthy middle- or high-EP individuals.

Publicly available sales reports usually boosted due to the pandemic despite the fact that personal income remained unchanged, or even decreased as a result of escalating unemployment. For example, net sales at the largest online retail company, Amazon increased by 29% in 2020 Q2 and by 27% in Q3 (from $63.4 in 2019 Q2 to $88.9 in 2020 Q2[2] and from $70.0 billion in 2019 to $96.1 in 2020[3]). About 8.2% in Q2 was probably due to the pandemic alone (expected $81.6, but realised $88.9 billion[1]). During the same period, unemployment increased from around 5% to around 15% between April and June 2020 (then slowly decreased to 6–7%)[4]. As an attempt to reduce the economic damage the administrative power issued the first Stimulus Package on the 27th March 2020 arriving on bank accounts about two weeks later. The Coronavirus Aid, Relief, and Economic Security (CARES) Act amounted to 10% of the total U.S. gross domestic product and allocated money to individuals ($1,200 per adult and $500 per child) in the low- and middle income social class among other provisions (H.R.748)[5]. Although a certain portion of the fund received by households was likely to have been spent on essential products, such as food or everyday household goods, unplanned products might have also been bought from the extra fund.

[2]https://s2.q4cdn.com/299287126/files/doc_financials/2020/q2/Q2-2020-Amazon-Earnings-Release.pdf.

[3]https://s2.q4cdn.com/299287126/files/doc_financials/2020/q3/AMZN-Q3-2020-Earnings-Release.pdf.

[4]https://www.bls.gov/news.release/pdf/empsit.pdf.

[5]https://www.congress.gov/bill/116th-congress/house-bill/748/text.

Thus, the availability of an unexpected financial resource provided a unique opportunity to assess the possibility that this may have boosted compulsive buying patterns in different socio-economic classes.

Neither the impact of elevated distress nor the effect of a large financial aid on compulsive buying has been explored before. The only study, which focused on the effects of a natural disaster (i.e., Hurricane Katrina) found an increase in compulsive buying tendencies as a result of depressive states (Sneath et al., 2009). In line with this finding, a recent study reported that the loss of safety (fear of Covid-19 and low political trust) significantly increased compulsive buying (Lopes & Jaspal, 2020). Consequently, although the relationship between status (income), indebtedness, distress and compulsive buying has been previously explored, the Covid-19 pandemic situation and the unexpected financial aid from the government provided a unique context for assessing the relationships among the variables.

More specifically we addressed the following research questions:

1. We aimed to explore whether compulsive buying increased in the first six months of Covid-19 and if this increase is related to self-reported economic position or to income group status.
2. We wanted to assess the possibility that compulsive buying tendencies further increased once disposable money became available for Americans due to the first Stimulus Package via the CARES Act. We further aimed to explore whether this increase is particularly pronounced across self-reported economic positions and income groups.
3. We aimed to examine whether the degree of compulsive buying was associated with the experience of distress during Covid after controlling for self-reported economic position, income and age.
4. We wanted to investigate whether distress was more strongly associated with compulsive buying during Covid-19 in low self-reported economic position/income participants than among those with average or high self-reported economic position/income.

METHODS

Procedure

A previous article has already been published from the same data collection on addiction-related behaviours (Maraz, Katzinger, & Yi, 2021). Data were collected every three days from Amazon's MTurk between 26/03/2020 and 02/10/2020 (inclusive) covering a period of 191 days (from Day 14 till Day 204 of the pandemic). Each time a new cohort of 25 participants were sampled excluding the participants who had previously taken part. Participants were able to take part if they were above the age of 18 (as verified by Amazon) and they were logged in from a US-based IP address. Participants were paid $2.1 per questionnaire, which was an adequate payment based on feedback.

Measures

The start of the pandemic was defined as the 13th of March 2020 when President Trump issued the Proclamation on Declaring a National Emergency Concerning the Novel Coronavirus Disease (COVID-19) Outbreak, declaring a national state of emergency. The first stimulus package was issued on the 27th March 2020 (Day 15) but arrived at bank accounts on the 11th April 2020 onwards (Day 30). Thus "pre" stimulus package period was defined as the first 15 days of data collection (Day 14 - Day 29), and "post" stimulus package as 15 days after the money arrived to bank accounts (Day 30 - Day 45).

Offline compulsive buying was measured with the Bergen Shopping Addiction Scale (BSAS, Andreassen et al., 2015). The BSAS contains 28 items, four for each of seven addiction criteria (salience, mood modification, conflict, tolerance, withdrawal, relapse, and problems) based on Griffiths's (2005) "components" model of addiction. After administering the scale to over 23,000 participants, the factor structure, convergent and divergent validity of the scale was found to be acceptable. In the current survey the question to participants was to tell why they enjoyed (or didn't) brick-and-mortar (offline) shopping *in the past 30 days* (i.e. "*I thought about shopping/buying things all the time.*" or "*I decided to shop/buy less, but have not been able to do so.*"), and answer alternatives were from Completely disagree (= 1) to Completely agree (= 5). The total score ranged between 28 and 140 with higher scores indicate higher probability for the presence of shopping addiction/compulsive buying. The BSAS was only presented to those who made an offline purchase in the past seven days, and items were presented in random order. In the current sample McDonald's omega (Dunn, Baguley, & Brunsden, 2014) was 0.99, indicating a very good fit to the data.

Online compulsive buying was assessed with the twenty-eight-item Compulsive Online Shopping Scale (COSS) (Manchiraju, Sadachar, & Ridgway, 2017). This scale was adapted from the BSAS (Andreassen et al., 2015) by adding the word "online" to items (i.e. "*I thought about shopping/buying things online all the time.*" or "*I decided to shop/buy less online, but have not been able to do so.*)" The new instrument was then tested on a US panel sample of 313 adults (mostly females) with the same answer alternatives as for the BSAS (Completely disagree = 1, to completely agree = 5, total score ranging between 28 and 140) and the instrument with seven factors was found to fit adequately to the data. The COSS assessed past-30-day purchase attitudes, and was only presented to those who made an online purchase no more than seven days prior to assessment. Higher scores indicate higher problematic behaviour and the internal consistency of the measure was excellent (McDonald's omega = 0.98).

Distress was addressed via the 14-item Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). This time frame for reporting distress was modified from past month to past seven days in the current survey in order to capture the dynamic experience of distress in the Covid-era. Items represent the subjective experience of distress, for example by

asking "*In the last month, how often have you found that you could not cope with all the things that you had to do?*" Predetermined answers were provided from Never (=1) to Very often (=5) with the total possible score ranging between 14 and 70. The instrument contains several reversed items, and higher scores indicate higher levels of distress. McDonald's omega of factor saturation was 0.84 in the current sample.

Covid-19 related stress was assessed with a single item: "How stressful do you feel about the current situation caused by the corona virus outbreak?" Participants responded on a ten-point scale: 1 (Not at all stressful) to 10 (Very stressful).

In order to increase data quality, the Marlowe-Crowne Social Desirability Scale Short form (M-C Form A, 10 items) was presented to participants (Reynolds, 1982). This instrument has no validated cut-off to exclude socially desirable respondents. We chose the maximum score (10/10) to indicate biased responding.

Economic position (EP) was assessed with two measures. First, we assessed participants' subjective sense of EP (= self-reported EP) with the following question: "*How wealthy do you think you are compared to others?*". Seven alternatives were offered between "Among the poorest" (= 1) and "Among the wealthiest" (= 7) (Maraz, van den Brink, & Demetrovics, 2015). Income, a proxy of socio-economic situation, was assessed with the following item: *What was your income in the past 30 days? Please include your net salary and all other "extra" earnings too.* Answering was optional. Seven alternative categories were provided, with options for yearly and the corresponding monthly income, i.e. "$25,000-$34,999 a year ($2084-$2,916 a month)". According to the United States Census Bureau's Annual ASEC survey[6], the median personal income for 2020 was $43,206.00 (with an average of $62,518.13). Thus income under $50,000 was defined as low, between $50,000 and $75,000 as medium, and above $75,000 as high income.

Debts were assessed with two questions. One question was about participants' credit card balance ("*Do you have an unpaid amount on your credit balance that is overdue?*"), and the other asked about overdue payment for previous shopping (debt for company, "*Do you currently owe money to a company because of shopping? (i.e. you bought something and the bill is overdue)*"). Both questions were optional. Seven response alternatives were categorised for both questions: less than $100, $100-$249, $250-$599, $600-$1,199, $1,200-$1999, $2000-$3,999, $4,000-$9,999 and over $10,000.

Finally, the past seven-day online spending was assessed with categories such as grocery, clothes, shoes, electronics, hobby, jewellery, etc. with the following question: *"Now we would like to know what you bought in the past seven days. Have you bought any of the following items?"* when answered positively, then a follow-up question was displayed: "How much did you pay for [name of the category] in the past seven days (in total, if you bought several items)?". Categories were defined as: less than $50, $50–$99, $100–$249, $250–$499, $500–$1,000, and over $1,000.

[6]https://www.census.gov/programs-surveys/decennial-census/decade/2020/2020-census-main.html.

Data cleaning and statistical analysis

Several measures were taken to increase the quality of data. Three attention check items were hidden among regular items (e.g. *"Please check "true" here."*). Participants' age was asked twice, and they scored an error if the answers were different. Those scoring more than one (out of four) attentional errors were excluded from the sample. Finally, those with maximal score on the Marlowe-Crowne Social Desirability Scale (10 out of 10) were also excluded. Out of the initially collected sample of 1885, 1,605 were complete. After excluding those with more than one error (145) and those with 10/10 lie score (30), 1,430 participants' data were left for the analyses. The median time of filling out the questionnaire was 11.1 min (mean: 26.2).

Given that group sample size across different self-reported EP groups were very different, we merged the low-EP groups (poorest, poorer and poor) and the high-EP (richest, richer and rich) groups to increase statistical power in the analyses. To test associations we used Pearson correlation between continuous variables, and Kendall's tau (τ) for ordinal (and continuous + ordinal) measures, which can handle ties in the data where members of the pair have the same ordinal value (Khamis, 2008). Regular *t*-test were used when comparing a continuous variable between groups, or its non-parametric equivalent, Welch test, when data were non-normally distributed. *F*-test was used to compare more than two groups. Cohen's *d* estimates were used to assess the effect size between two groups, and 95% confidence interval (CI) around the correlation coefficients to assess true differences between point-estimates. Regression model was used to test predictors of online/offline compulsive buying and the significance of their (standardised) effect.

Data were collected using formr (Arslan, Walther, & Tata, 2020), analysed and visualised in R (R Core Team, 2013) using base packages and ggplot2 (Wickham, 2016). The data collection procedure was pre-registered prior to data collection under the following link: https://osf.io/m5kw9. All data, material and scripts of analyses are available open-access under https://osf.io/qdhp4/and https://github.com/anikomaraz/shopping_covid19.

Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of the Humboldt University of Berlin approved the study (2020-15R3). All subjects were informed about the study in compliance with the GDPR, were at least 18 years old, and all provided informed consent before entering the study.

RESULTS

Sample description

Overall data were available from 1,430 participants following data cleaning (i.e. attention check items). Average age was 36.4 years (SD: 11). Sixty percent of our participants were

male, 39.3% female, and 0.5% did not indicate their gender. Most participants had an undergraduate degree (43.8%), whereas 31.3% had lower, and 24.91% had a higher educational level. The majority of participants had a full time job (80%), and were in a relationship (76%). Overall 1,111 (78%) participants made an offline purchase, and 1,136 (80%) an online purchase in the past seven days prior to responding to the survey items. Only a minority (5.5%, $n = 79$) did not make any purchase, and about 63% of them ($n = 896$) made both online and offline purchases in the past seven days.

As it appears in Suppl. 1, most participants spent on health and beauty products, followed by groceries, and to a decreasing extent books, movies, music and games. As the pandemic proceeded, participants tended to spend more in each category. Participants reported having overdue credit card balances and debts to a company, although most were debt-free (see Suppl. 2).

Compulsive buying in the first six months of the pandemic (Aim 1)

As seen in Fig. 1 both online and offline compulsive buying tended to increase as the pandemic grew, especially after the introduction of the first stimulus package. The association between compulsive buying and time are significant both in the online ($\tau = 0.24$, $P < 0.001$) and in the offline context ($\tau = 0.22$, $P < 0.001$).

We assessed the possibility that this pattern may have been different across self-reported economic position and income groups. Within the online context, the low-EP group reported significant increase within their compulsive buying tendency ($\tau = 0.24$, $P < 0.001$), the average-EP and high-EP groups' compulsive buying tendencies remained non-significant (average: $\tau = 0.07$, $P = 0.14$; high: $\tau = -0.06$, $P = 0.18$). The pattern was similar within the offline context, although the association was weaker but significant in the average group as well (low: $\tau = 0.22$, $P < 0.001$; average: $\tau = 0.11$, $P = 0.02$; high: $\tau = -0.01$, $P = 0.74$).

As for income-derived groups, individuals with both low ($\tau = 0.24$, $P < 0.001$), and middle ($\tau = 0.30$ $P < 0.001$) income increased their online compulsive buying, whereas the increase was marginally significant in the high-income group ($\tau = 0.12$, $P = 0.05$). Similarly, offline compulsive buying tendency significantly increased over time for both low ($\tau = 0.23$, $P < 0.001$) and middle ($\tau = 0.28$, $P < 0.001$) income groups, while the pattern was not significant for the high income group ($\tau = 0.07$, $P = 0.24$). This pattern was essentially the same as the findings derived from self-reported EP-derived groups (for visualisation see Suppl. 3).

The effect of the stimulus package (Aim 2)

To calculate the effect of the stimulus package, the first 15 days of data collection (before the financial aid arrived at bank accounts) was compared to the next 15 days when the money was available for spending. As seen in Table 1, compulsive buying significantly increased in the online (but not in the offline) context following the stimulus package with a medium effect size (Cohen's $d = 0.33$). However, significance was undetectable within EP groups (see Table 1). The offline shopping context remained unaffected.

Compulsive buying in response to distress during Covid-19 (Aim 3)

In Fig. 2, we plotted online as well as offline compulsive buying tendencies per group derived from EP and income measures. Groups were visualised separately, but merged to increase statistical power in the analyses (poorest, poorer and poor groups were combined to "low-EP", and richest, richer and rich groups to "high-EP"). Overall, high-EP participants reported higher tendencies in both online and offline compulsive buying. In terms of mean differences in online compulsive buying (COSS), the high-EP groups reported the highest values (mean: 106.2, SD: 18.3), followed by the low-EP groups (67.5, SD: 31.4) and the average-EP participants (55.8, SD: 25.9) (F (2, 711) = 222.3, $P < 0.001$). Results were similar in the offline context ($\text{mean}_{\text{high}} = 105.1$, SD = 18.6; $\text{mean}_{\text{low}} = 67.11$, SD = 32.8; $\text{mean}_{\text{average}} = 55.9$, SD = 28.5), and all group differences were significant at the level of $P < 0.05$ (F (2,697) = 188).

The zero-order correlation between distress and online compulsive buying was $r = 0.45$ ($P < 0.001$, 95% CI: 0.41–0.50), and the one between distress and offline compulsive buying was $r = 0.47$ ($P < 0.001$, 95% CI: 0.43–0.52). Furthermore, high-EP participants experienced the highest distress (41, SD = 4.1), followed by the poor-EP group (38.2, SD = 9.9), and the average group (36.4, SD = 10.2), and all group differences were significant (Bonferroni-corrected group differences: all $P < 0.03$; F-statistics: F (2, 907) = 20.8, $P < 0.001$, $R^2 = 0.04$). Correlation between EP and income was $\tau = -0.01$, $P = 0.64$; whereas between age and EP was $\tau = -0.05$, $P = 0.03$ and between age and income was $\tau = 0.05$, $P = 0.01$ suggesting that EP and income measure different constructs, and their association with age is only weak (although significant).

In order to assess the relationship between distress and compulsive buying above and beyond the association of income and EP, we separately regressed BSAS and COSS on distress, income, EP and age. We found that although online compulsive buying was significantly predicted by income, EP and age, distress was also a significant positive predictor ($\beta_{\text{PSS}} = 1.3^{***}$, $\beta_{\text{EP}} = 5.13^{***}$, $\beta_{\text{income}} = 2.6^{***}$, $\beta_{\text{age}} = -0.20^{*}$, F (4, 709) = 53.01, $R^2 = 0.23$, RSE = 29.5). Similarly, offline compulsive buying was positively predicted when the effects of income, EP and age were taken into account ($\beta_{\text{PSS}} = 1.45^{***}$, $\beta_{\text{EP}} = 4.86^{***}$, $\beta_{\text{income}} = 2.16^{***}$, $\beta_{\text{age}} = -0.08$ $P > 0.4$; F (4, 695) = 49.54, $R^2 = 0.22$, RSE = 30.41). Thus the distress has a weak, though independent effect from EP, income and age on compulsive buying. Furthermore, the effect of EP appears to be stronger than the effect of income.

The relation between distress and compulsive buying: Differences among EP/income groups (Aim 4)

Figure 3 displays the correlation between distress and compulsive buying in the total sample and by each EP

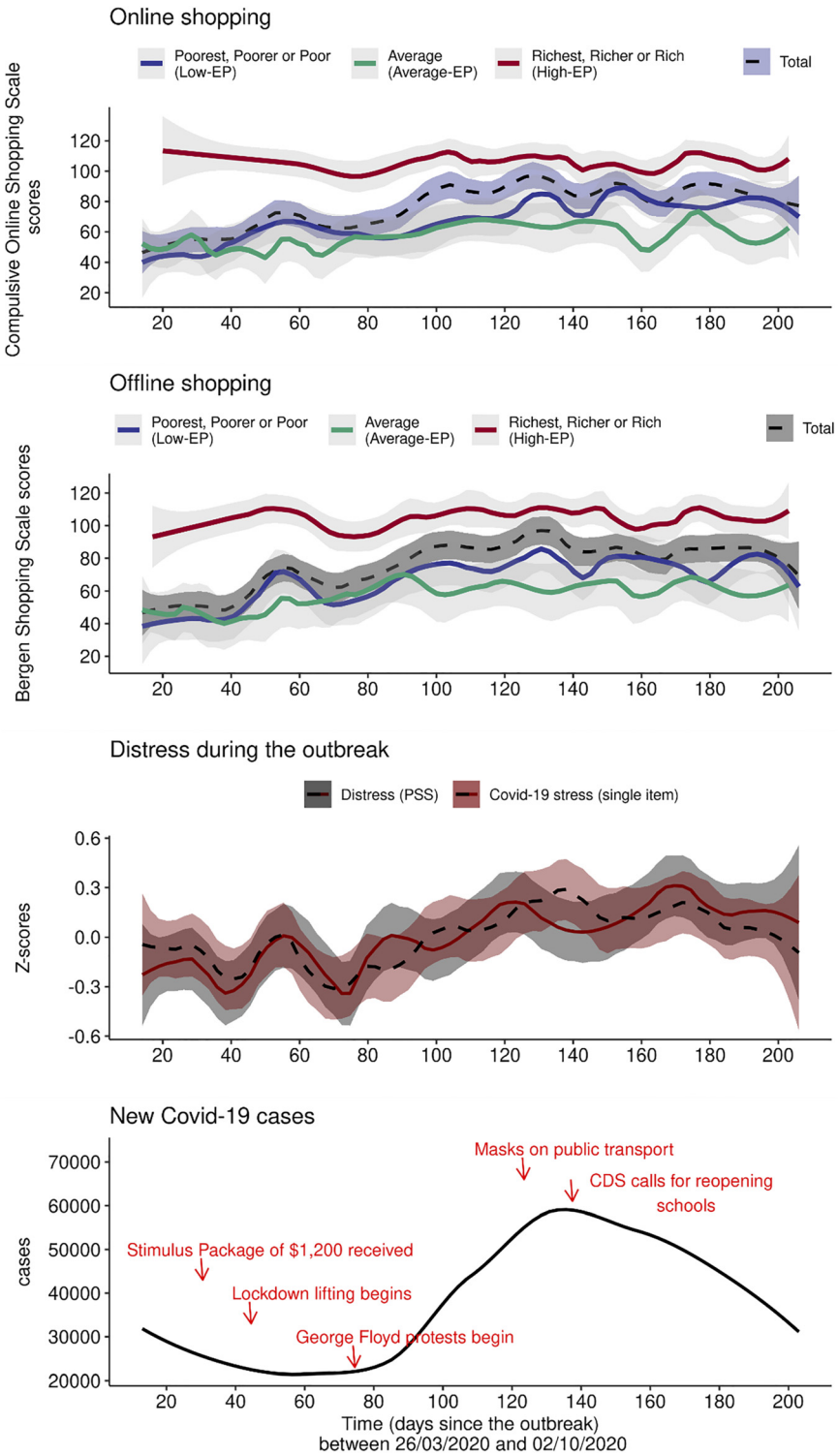

Fig. 1. Compulsive buying represented alongside economic position, distress and case numbers in the US
Note: smoothed lines are presented to reduce noise in visualising. Grouping (low-EP: poor-poorer-poorest, average, high-EP: rich-richer-richest) reflects self-reported economic position. Case numbers are taken from https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide

group. As a visual trend, participants with medium distress (about 35–50 on the PSS) appear to report the highest compulsive buying tendencies in each EP group.

The correlation between distress and online CB was significantly positive in the three income-derived groups (N_{low} = 727, r = 0.38, P < 0.001, 95% CI: 0.31–0.44; N_{medium} = 200, r = 0.62, P < 0.001, 95% CI: 0.52–0.70; N_{high} = 133, r = 0.67, P < 0.001, 95% CI: 0.57–0.76). Similarly, the Pearson correlation between distress and online compulsive buying was significantly positive in all the EP-derived groups

Table 1. Compulsive buying before and after the stimulus package

Economic Position	*N*		Compulsive Buying mean (SD)		Pre-post Difference	
	Stimulus Package		Stimulus Package			
	Pre	Post	Pre	Post	Welch test *t* (df)	Cohen's *d*
Online compulsive buying (COSS)						
Low-EP	32	27	44.09 (14.6)	50.67 (23.3)	1.27 (42.2) n.s.	
Average-EP	33	19	51.88 (18.0)	46.79 (16.0)	–1.05 (41.4) n.s.	
High-EP	3	6	108.33 (42.9)	108.33 (24.3)	0 (2.67) n.s.	
All	*68*	*52*	*50.09 (22.6)*	*58.33 (27.6)*	*2.33 (193.0)**	*0.33 (95% CI: 0.05, 0.60)*
Offline compulsive buying (Bergen Shopping Scale)						
Low-EP	28	20	40.6 (14.7)	44.3 (21.8)	0.65 (30.94) n.s.	
Average-EP	37	16	48.6 (16.2)	40.4 (14.4)	–1.83 (32.02) n.s.	
High-EP	6	6	96.5 (31.9)	96.2 (22.6)	–0.02 (9.01) n.s.	
All	*71*	*42*	*48.5 (23.4)*	*54.4 (27.5)*	*1.56 (156.2) n.s.*	

Note: *<0.05. "Pre" stimulus package was defined as the first 15 days of data collection (Day 14 - Day 29), and "post" stimulus package as 15 days after the money arrived to bank accounts (Day 30 - Day 45). Categories within "low-EP" (poor, poorer and poorest) and "high-EP" (rich, richer, richest) were merged to increase statistical power.

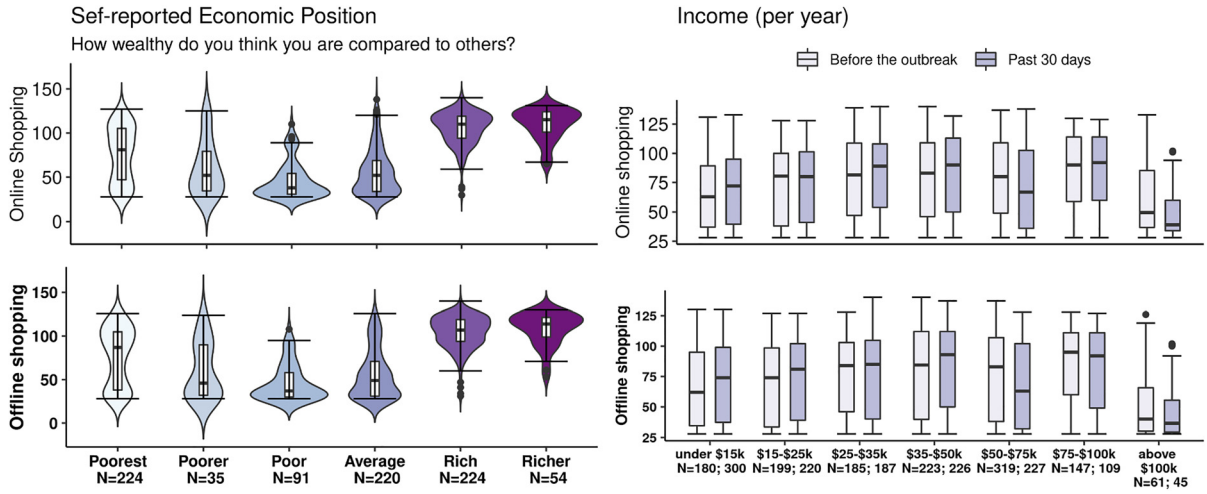

Fig. 2. Compulsive buying, EP and income

Note: violin plots reflect the distribution of the data, whereas lower and upper hinges of the boxplots correspond to the first and third quartiles (the 25th and 75th percentiles) of the data. Data beyond the end of the whiskers are outliers. Participants had the option to refuse answering any of the items visualised on the plot. None of the participants indicated belonging to the "Richest" category, thus this was removed from the figure.

(N_{low} = 297, r = 0.31, P < 0.001, 95% CI: 0.21–0.41; $N_{average}$= 184, r = 0.4, P < 0.001, 95% CI: 0.27–0.51; N_{high} = 233, r = 0.31, P < 0.001, 95% CI: 0.19–0.42). Given their non-overlapping CIs, the low-income group reported significantly lower correlation between distress and compulsive buying compared to the high-income group.

In terms of offline shopping all within-group correlations were significant in the income groups (N_{low} = 723, r = 0.42, P < 0.001, 95% CI: 0.36–0.48; N_{medium} = 181, r = 0.62, P < 0.001, 95% CI: 0.52–0.70; N_{high} = 130, r = 0.61, P < 0.001, 95% CI: 0.49–0.71). Similarly, coefficients were significant within the economic position groups ($N_{low\text{-}EP}$ = 285, r = 0.36, P < 0.001, 95% CI: 0.25–0.46; $N_{average}$ = 191, r = 0.38, P < 0.001, 95% CI: 0.25–0.50; $N_{high\text{-}EP}$ = 233, r = 0.30, P < 0.001, 95% CI: 0.17–0.41). Given the 95% confidence intervals of the point-estimates, the difference in low vs. medium, and low vs. high income were meaningful, but the between-group differences according to EP-derived groups were nonexistent.

DISCUSSION

The current study aimed to explore compulsive buying tendencies during the first six months of the Covid-19 pandemic in a sample of 1430 US participants. Overall, compulsive buying patterns (online and offline) increased during this period, especially among less wealthy individuals (Aim 1). After the CARES Act (first stimulus package), compulsive buying activity increased in our sample, but only

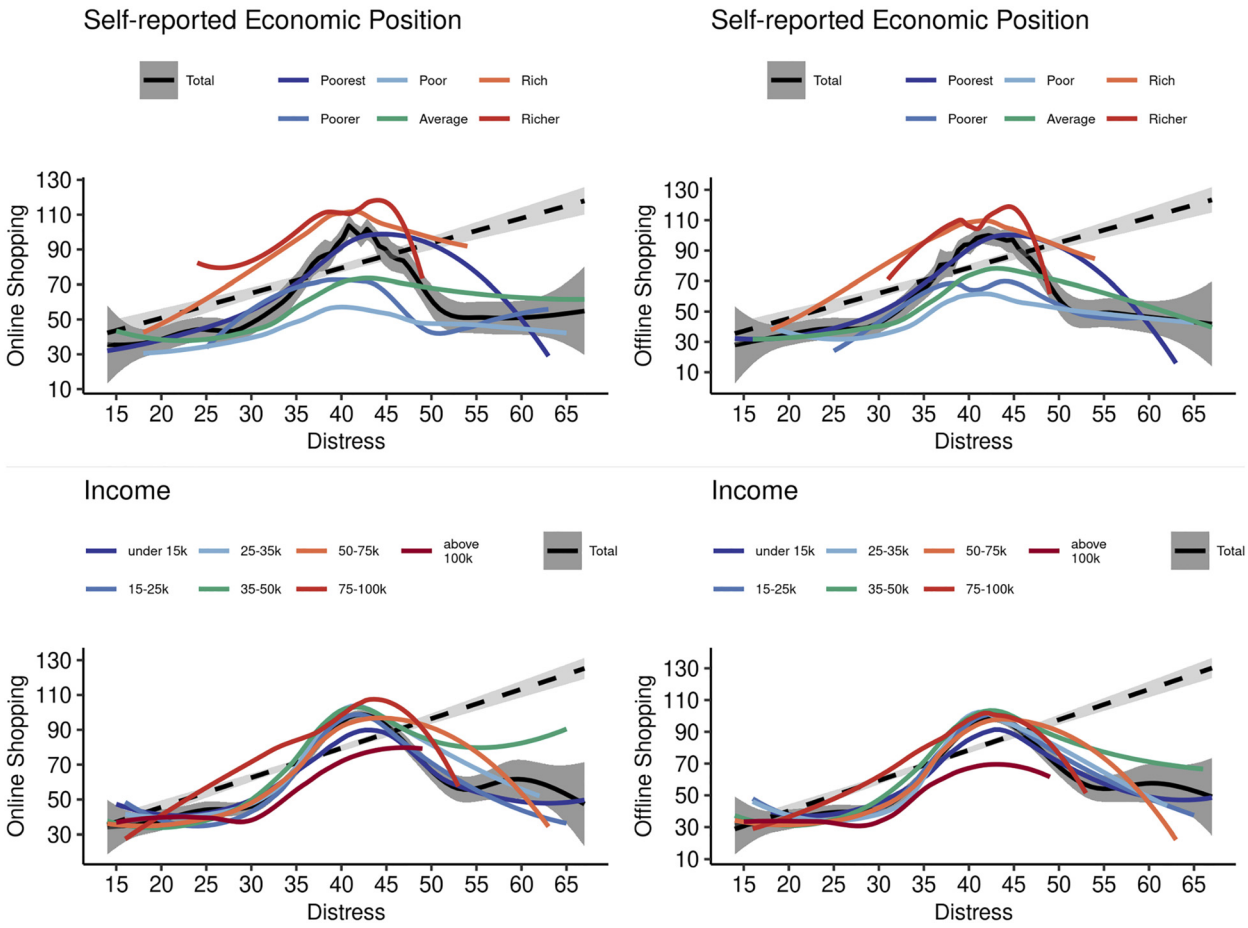

Fig. 3. Self-reported economic position, distress and compulsive buying
The dashed line is the linear regression line between distress and shopping. Self-reported economic position was assessed as "How wealthy do you think you are compared to others?" Answers were re-grouped in the analyses as high-EP (rich, richer or richest), average-EP, and low-EP (poor, poorer or poorest). Online shopping was measured with the Compulsive Online Shopping Scale. Offline shopping was assessed via the Bergen Shopping Scale.

in the online context (Aim 2). Although self-reported economic position was the strongest predictor of compulsive buying in our model both in the online as well as in the offline context, the intensity of distress positively influenced compulsive buying above and beyond the effect of self-reported economic position (EP), income and age (Aim 3). The correlation between distress and compulsive buying was higher among individuals with high income compared to the below-average income group (Aim 4). Thus, the tendency to engage in compulsive buying as an attempt to cope with distress during the period of chronic stress was more pronounced among people with high self-reported economic position than among those with low or middle economic position, which cannot be attributed to distress alone.

In terms of our first aim, we found a gradually increasing trend of compulsive buying patterns during an extended period of the Covid-19 pandemic from our sample. Although there was an indication that compulsive buying increased after the outbreak of pandemic compared to before (Lopes & Jaspal, 2020; Xiao et al., 2020), the gradual increase of compulsive buying over an extended period during the course of pandemic has never been reported before. When grouping by economic position, we found that the increase in compulsive buying pattern was significant only in the low-EP and low-income groups both in the online and in the offline context. The trend was not significant for the high-EP and high-income groups (and was significant but weak for the average-EP). The overall increase in compulsive buying tendency in our sample is not surprising. Given the strong association, elevated compulsive buying tendency is likely to be the result of increased and chronic stress, and the restricted availability of other, healthier coping strategies (social interactions, most forms of physical exercise, recreational travelling, etc.), which possibly resulted in escaping into compulsive buying (Király et al., 2017). There was previous evidence, that people seek substitutes when a ban is introduced on recreational but potentially harmful activities such as alcohol and cigarette consumption in South Africa (Sinclair et al., 2021) or abuse alcohol when less adaptive coping strategies were favoured (Chodkiewicz et al., 2020) especially in those with high worry about Covid-19 situations (Czeisler et al., 2020; Rogers et al., 2020). This is probably due to the fact that addiction, in this case compulsive buying, is an attempt to

adapt to interpersonal trauma, as a result of "compromised abilities to form healthy attachments and decreased capacity for self-regulation" (p. 352. Padykula & Conklin, 2010). However, regarding the findings according to economic position/income group the increase in compulsive buying was only significant among those with a low EP and those with average or below-average income, which may have come as a surprise. It is possible that high-status participants could afford to shop throughout the study period as a way of improving their mood, whereas their less wealthy counterparts restricted their compulsive buying habits when the pandemic approached, and then increased their buying as a result of (ego-control) fatigue as the pandemic grew. This is an especially likely explanation given according to a recent meta-analysis, socioeconomic inequalities were clearly present in terms of unemployment, infection risks as well as the severity of the course of the disease, with the less privileged individuals being hit harder (Wachtler et al., 2020).

Our second aim was to assess the effect of the CARES Act (the first stimulus package) on compulsive buying. This Act provided financial help for the middle and lower social classes with the aim of boosting the economy. Economists generally found that people spent about the third of the funds within 10 days of receiving it, and those with less initial money in their bank accounts tended to spend more of the financial aid right away[7]. This effect partially appeared in our sample. Total compulsive buying tendency to buy online (but not offline, because brick-and-mortar shops were closed in most states during this period) significantly increased from 14 days before to 14 days after the financial aid was available on bank accounts. It is possible that the easier access of online as opposed to offline shopping is a favourable condition for the development of compulsive buying, especially because the goods are easier to hide from the social environment (Adamczyk, 2021). However, the increase in compulsive buying within each economic position/income group was not significant. More data are needed to draw firm conclusions on the effect of the stimulus package according to economic position and income.

Our third aim concerned the relationship between distress and compulsive buying. We found that distress was a significant and strong predictor of compulsive buying, although this effect was rather small when economic position, income and age were added as predictors. Thus it is rather the standard of living, i.e. the availability of funds that triggers compulsive buying in the presence of distress, rather than distress *per se*. Therefore it might be possible that in the presence of distress, people choose addictive behaviours depending on the availability of other instruments, such as money. It is likely that individuals who reported problematic addictive behaviours (i.e. heightened tendency for overbuying as a result of higher standard of living) before the pandemic would be especially likely to lose control over their behaviour during the pandemic as a result of elevated distress (and develop compulsive buying). There is already evidence for this mechanism (Czeisler et al., 2020; Rogers et al., 2020).

To further clarify the role of self-reported economic position and income in the relationship between distress and compulsive buying, we calculated the association within each economic position/income group as our Aim 4. Although the correlations were equally strong between economic position groups, high- and average-income participants reported higher association between distress and compulsive buying than low-income participants. This indicates that participants with average or high income are more likely to lose control in the presence of distress than those with lower income, which fits the pattern of the regression model (Aim 3), in which we found that much of the effect of distress is conveyed by the standard of living. However, this finding is contrary to most representative studies reporting that low-EP individuals have higher compulsive buying tendencies than high-EP people, which is usually attributed to the fact, that low-EP individuals use lower-quality coping and higher resting cortisol levels than high-EP individuals (Schmeelk-Cone, Zimmerman, & Abelson, 2003). In any case, financial status cannot be ignored when measuring compulsive buying, i.e. by omitting items of a questionnaire that assess the financial implications of buying activity (Ridgway, Kukar-Kinney, & Monroe, 2008), since economic position/income were more important predictors of compulsive buying than distress during our time frame.

Our findings appear controversial regarding the role of economic position in compulsive buying. One one hand, participants with high economic position reported the highest average compulsive buying values throughout the time frame, but the increase in compulsive buying pattern over time was only significant among the low-EP participants. On the other hand, the association between distress and compulsive buying was the strongest among the high-EP participants. One explanation for these findings could be that a substantial proportion of high-EP individuals recruited in our sample may already have had high levels of compulsive buying at the time of the pandemic outbreak, reached a plateau in their compulsive buying activity early on, and continued to buy due to high distress and high resources In contrast, less wealthy participants appeared to have withheld spending prior to the Covid-19 outbreak and to gradually lose control over shopping behaviour as a result of the stress related to Covid-19. This conjecture appears tenable given spending patterns reported in Suppl. 1. As the pandemic progressed, the buying of clothes, shoes, electronics and gifts showed a steep increase, but spending on most other goods was stagnant until Day 80, when distress and case numbers also started to increase. Economists also observed a shift in patterns. After the initial panic buying subsided, spending in home apparel, beauty, and electronics increased, as extra money normally spent on restaurants and travel was suddenly available[8].

[7]https://insight.kellogg.northwestern.edu/article/stimulus-checks-spending-data-2020-coronavirus-covid.

[8]https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/survey-us-consumer-sentiment-during-the-coronavirus-crisis#.

In many regions in the United States, part of the lockdown was the periodic restriction on brick-and-mortar shopping opportunities. This could have resulted in binge-shopping before and after the measure came to power. However, our data suggest that online and offline shopping were very similar in terms of trends and financial and/or psychological predictors. The only difference was that the stimulus package boosted shopping only in the online but not in the offline context, which was probably due to the fact that in many states brick-and-mortar shops were closed during this period.

This study has several limitations. First of all, we sampled a different cohort of people at each time point instead of using a follow-up design. We decided on this approach in order to avoid fatigue, dropout and the impact of major individual effects (i.e. becoming unemployed) in the sample. However, one disadvantage of our approach was that we were not able to conduct a longitudinal assessment of prolonged effects during the Covid-19 situation. Second, since the sample consisted of MTurkers, some caution may be necessary before generalising our findings to other people. However, it has been found that after careful attention check and data cleaning measures, MTurk samples are more informative about the general population than most ad-hoc gathered (especially panel) samples (Kennedy et al., 2020; Smith, Roster, Golden, & Albaum, 2016). Thirdly, the instruments we used to assess online and offline compulsive buying (COSS and BSAS) are almost identical (Griffiths et al., 2016), which limits their validity. The similarity in wording could also be the reason why online and offline buying models appeared very similar to each other in our data. Fourth limitation is the differing time-frames of assessment: distress was measured in the past seven days, whereas compulsive buying was assessed for the past 30 days prior to data collection. We opted for this approach to reflect the effect of the quickly-changing pandemic measures (distress), whereas participants' spending habits, attached emotions and attitudes are best captured by a longer, thirty-day period to reflect the effect of income arriving on a monthly basis. However, since we tested the effects of distress on subsequent compulsive buying, a longer time frame for assessing the latter than the former may have had an impact on our calculations. Furthermore, using self-reported economic position and income as proxies for socio-economical status warrants caution when generalising the findings in economies other than the US. Finally, despite the significant correlations, it is possible, that third factors might mediate the effect of distress, such as health and economic fears (Eger, Komárková, Egerová, & Mičík, 2021), the de-facto cohabitation status (i.e. living alone or with family) the quality of social network (Lopes & Jaspal, 2020), pre-pandemic levels of use or abuse (Rogers et al., 2020), or daily fluctuations in effect (Buecker et al., 2020).

In conclusion, we found that compulsive buying increased during the first six months of the Covid-19 pandemic in the USA especially as a result of the first stimulus package. Although compulsive buying is affected by fluctuations in distress, self-reported economic position (a subjective evaluation of one's financial status) has a markedly large influence on the heightened compulsive buying tendency beyond the effect of distress. High-income people are more prone to compulsive buying than low-income individuals, thus financial status plays an important role in the maintenance of compulsive buying in addition to psychological factors such as distress. Further caution is necessary to track the changes in consumer behaviour, and how it affects well-being of those, mostly at risk of suffering the consequences of losing control over buying habits during these challenging times.

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Authors' contribution: AM designed the concept and delivery of the study, wrote the statistical analysis and interpreted the data. YS provided consultation on the design and interpretation of findings. Both authors had full access to all data in the study and they all take responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of interest: The authors declare no conflict of interest.

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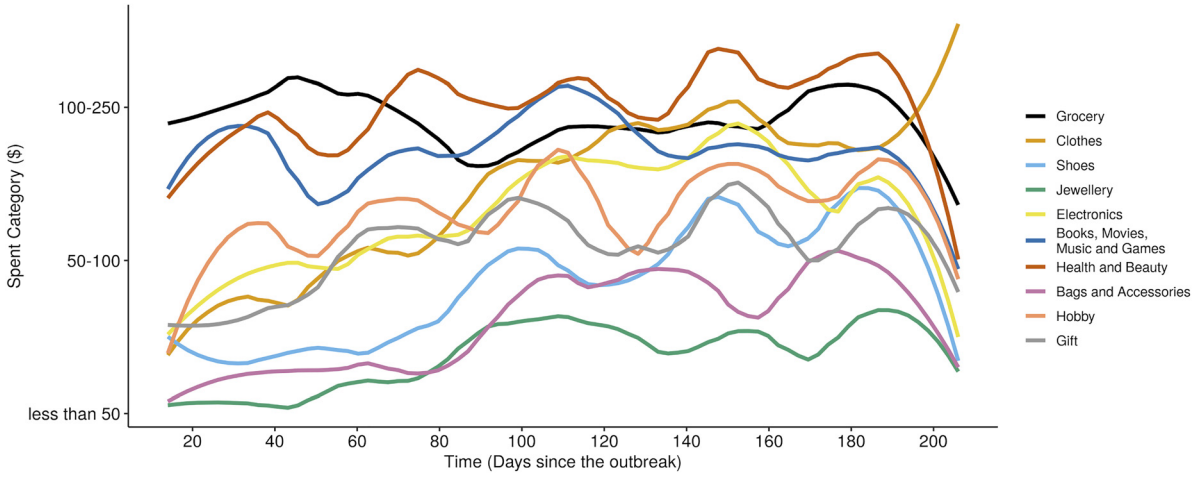
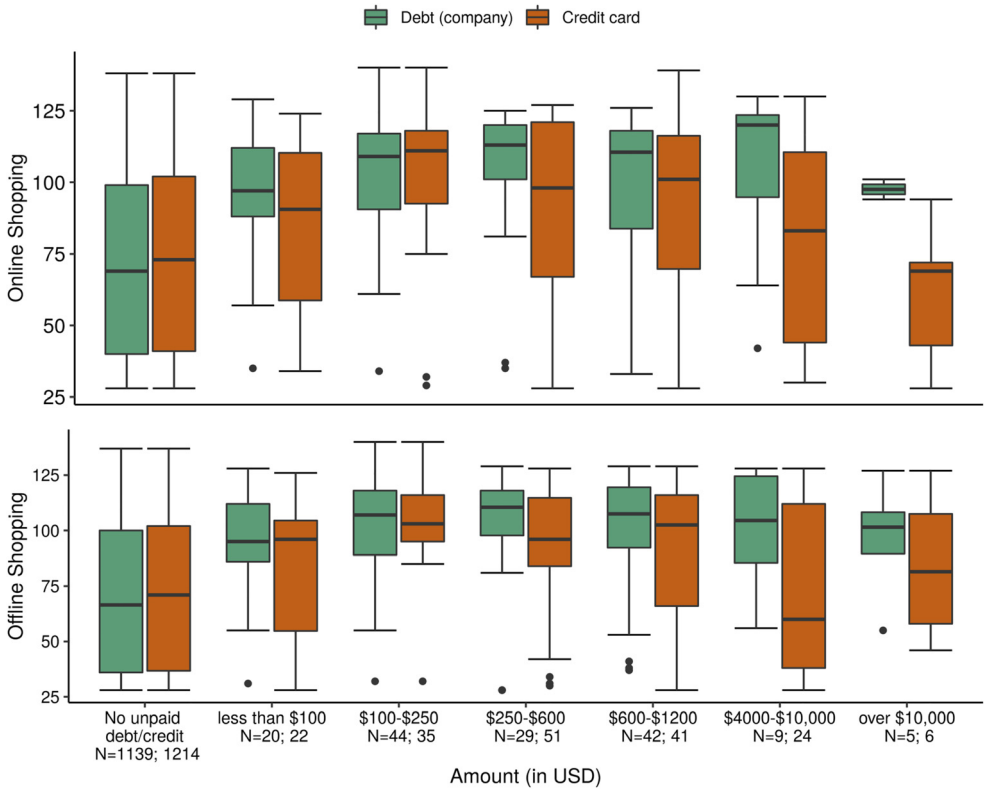
Supplement 1



Past seven-day spending during the pandemic (between 26/03/2020 and 02/10/2020).

Note: Lines are smoothed to reduce noise in the raw data. Participants were asked to select from pre-determined categories for their past-seven-day spending in the given goods category.

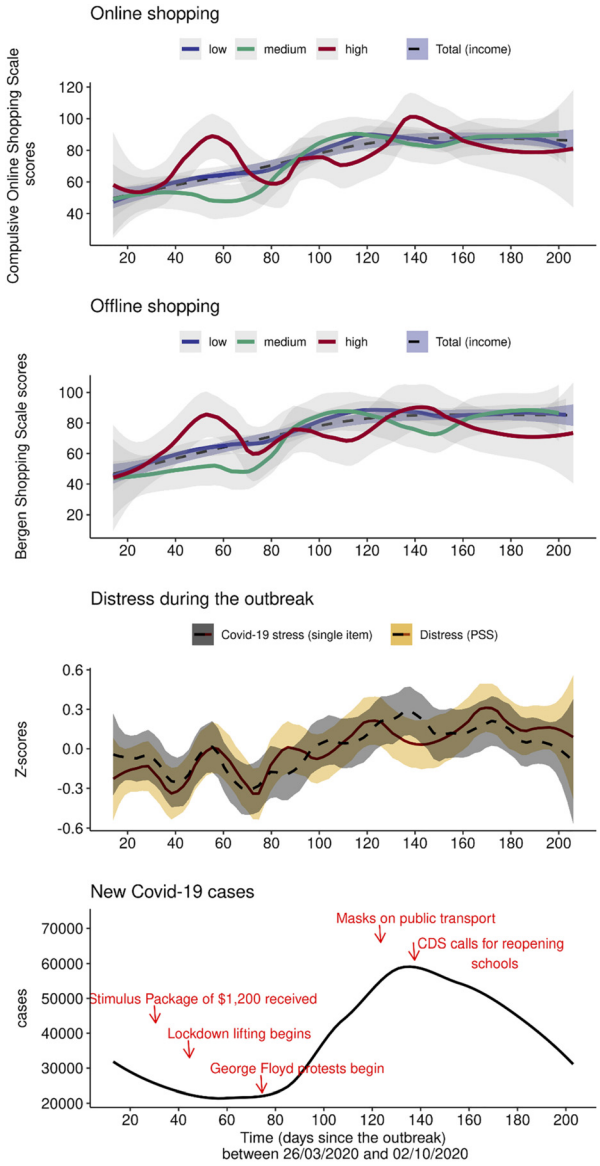
Supplement 2



Shopping-related credit card balance and debts.

Note: Company debt refers to the unpaid balance the participant owes the company, and credit card debt refers to the amount of unpaid balance on the credit card. "*N*" refers to the number of datapoints regarding company debt and credit card debt respectively. Lower and upper hinges of the boxplot correspond to the first and third quartiles (the 25th and 75th percentiles) of the data. Data beyond the end of the whiskers are outliers. Statistics do not confirm the relationship between online/offline compulsive buying and debt/credit card balance, but those with debt/unpaid credit balance report higher tendencies of online/offline compulsive buying (see text).

Supplement 3



Compulsive buying represented alongside distress and case numbers in the US and according to income groups.
Note: smoothed lines are presented to reduce noise in visualising. Case numbers are taken from https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide.