

Insatiable Desires:

How Dispositional Greed
Affects Everyday Life

Karlijn Hoyer



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Chapter 1

Introduction

In the late 1800s, “Greediness” was listed as a cause of mental illness and being greedy was a reason for admission to Trans-Allegheny Lunatic Asylum (also known as the West Virginia’s Hospital for the Insane; Charleston, 2019). Greed was listed alongside other more common causes underlying mental maladies such as “Grief” or “Excessive sexual abuse” as well as a few more uncommon, and perhaps more curious, causes such as “Novel reading”. Today, greed is not part of the Diagnostic and Statistical Manual of Mental Disorders (DSM–5) anymore, but a related condition is: Hoarding Disorder. Compulsive hoarding tendencies actually occur across a variety of mental disorders, including not only hoarding disorder, but also obsessive-compulsive disorder (OCD), and schizophrenia (Dozier & DeShong, 2022). Hoarding is characterized by “the acquisition of and failure to discard large numbers of possessions” (Frost et al., 2009, p. 632). According to Frost et al., approximately 85% of hoarders reported excessive acquisition, which is also a defining feature of greed. Interestingly, having a greedy personality is correlated with hoarding behavior (Yoshino et al., 2021), while only a small part of the general population actually suffers from a Hoarding Disorder (roughly 2.5%; Postlethwaite et al., 2019), greed is quite common in everyday life.

The word greed has a negative connotation, and most people do not aspire to be labeled greedy (Gilliland & Anderson, 2011). Greed received particularly much negative media attention after the 2008 global financial crisis, with headlines in the press like “How greedy US banks crippled world economy” (Business Standard; Jauhri, 2018) and “What’s wrong with Wall Street? A culture that breeds greed” (PBS News Hour; Polk, 2016). As a result, many people lost their sympathy for the stock market which they now associate with greed, scandals and speculation (Wagner, 2020). A part of the general public was outraged and united themselves in the Occupy protest movement at the end of 2011 that targeted the industries and companies that were seen as responsible for the financial collapse (Dayno, 2018; Gilliland & Anderson, 2014). The message conveyed was clear: greediness led to unnecessary risk-taking and to behaving recklessly with clients’ money in order to ensure greater turnover and personal gains (e.g., Brummer, 2015; Papatheodorou et al., 2010). Besides the apparent association of greed and bad banking practices, greed has also been associated with things like employee theft (Caudil, 1988), corrupt mortgage lending (Morgenson & Rosner, 2011), white collar crime (Wang et al., 2019), and fraud (Sarna, 2010). More recent instances of greed were also encountered during the ongoing COVID-19 pandemic: Follow the Money, a platform for investigative journalism, for example, discovered that Sywert van Lienden, a Dutch lobbyist and political activist, allegedly profited 30 million euros from selling face masks in what he claimed was a non-profit deal (Mijnheer et al., 2021). Greed was also present on a smaller scale: for example, the hoarding of products like toilet paper, disinfection alcohol and instant foods at the start of the pandemic and the reselling of these products with a considerable profit margin (Sobirova, 2020), the recurring Black Friday holiday period madness where people often go to extremes to buy products that they do not actually need (Gertz et al., 2018), and those people that are always first in line at an all-you-can-eat buffet, shoveling huge piles of food onto their plates (Dholakia, 2015).

Many times has greed been condemned as being immoral, sinful, harmful for others or outright evil (cf. Bloch, 1984; Haynes, 2021; Tickle, 2004), but there are definitely also, less salient, views of greed being good. In economics, for example, greed is often hailed as the engine of economic growth, as it is argued to stimulate productivity (Bruhn & Lowrey, 2012; Greenfeld, 2001). Evolutionary theorist also argue that greed is something good, and even central to the prospects for survival of mankind (Jett, 2000). I will discuss these views in more detail later on.

Resting aside the questions of whether greed is a mental illness and whether it is good or bad (I will return to these questions in the Discussion of Chapter 7), greed, as we have seen in the above examples, is clearly a part of everyday life. Over the last decade, academic attention for greed has increased. For example, research has looked at how to conceptualize and operationalize greed (e.g., Krekels & Pandelaere, 2015; Lambie & Stickl Haugen, 2019; Seuntjens, Zeelenberg, Breugelmans, et al., 2015), how one's environment during childhood predicts greed later in life (e.g., Chen, 2018; Liu, Sun, & Tsydygov, 2019), how laypeople perceive greed (Gilliland & Anderson, 2014; Helzer & Rosenzweig, 2020), and whether greed predicts economic and financial behavior in everyday life (e.g., Mussel et al., 2015; Seuntjens et al., 2016) as well as the behavior of CEOs (Haynes et al., 2017; Sajko et al., 2021).

This recent research has led to valuable insights about what greed is, how it operates and what its consequences are. Nevertheless, there is still much about greed that we do not understand, and there are still several important questions that remain unanswered, for example, what are the origins of greed, is it really the cause of financial scandals and crises, and what are its social consequences? In this dissertation, I aim to uncover how greed affects everyday life. More specifically, I aim to understand more of the psychological mechanisms underlying greed and the financial, economic, and social consequences that greed has. I will first give a brief overview of the definitional issues surrounding greed and discuss the various scales that have been developed to measure individual differences in greediness. I will then address several open questions that I identified.

What is Dispositional Greed?

Greed has been a salient concept in religion, philosophy, politics and economics for hundreds of years (see, Haynes, 2021; Oka & Kuijt, 2014; Sutherland, 2014; L. Wang & Murnighan, 2011). In a comprehensive review of conceptual ideas on greed, Wang and Murnighan (2011), however, observed that empirical research on the dynamics of greed was rare, which they called rather surprising considering the long intellectual history of greed. They argue that one of the reasons for this paucity was that there was no consensus on how to define greed. They also noted that there are many different synonyms for greed, like avarice, cupidity, covetousness, gluttony or ambition, and argue that greed "takes different forms when it is directed towards different goals" (p. 282).

Notably, greed can be both an emotional state (i.e., temporary, acute, situation specific) as well as a motivational disposition (i.e., an enduring personality trait). Throughout this dissertation, I mostly refer to the later when I use the word 'greed'. Greed, as a personality trait, is naturally distributed (Preston & Vickers, 2014), meaning that, like most traits, individuals can differ in the extent to which they experience the desire to acquire more and more and the dissatisfaction with what they currently have.

Even though there still remain some differences in conceptualization of dispositional greed, the majority of researchers agree that the desire to acquire more is a defining feature of greed (Lambie & Stickl Haugen, 2019). Some researchers refer to this desire as *excessive* (e.g., Mussel et al., 2015; Wang et al., 2011) or *insatiable* (e.g., Seuntjens, Zeelenberg, Breugelmans, et al., 2015). Definitional differences arise when considering which additional features can be seen as a core part of greed.

The first point of discussion is whether greed should be narrowly defined as a desire for monetary or materialistic goods only, or should it also include desires for non-material goods. Bruhn and Lowrey (2012), for example, defined greed as "the inordinate need for the acquisition of materialistic wealth" (p. 138), whilst other authors, like Krekels and Pandelaere (2015), define it as: "the insatiable desire for more resources, monetary or other" (p. 225). I believe that people can be greedy for anything, most commonly for food, money, or material possessions, but also for less tangible things like power, attention or admiration, and sex.

A second discussion point is whether the desire to acquire more comes at all costs even if it leads to harm-to-others. Mussel et al. (2015; p. 126), for example, explicitly include the negative consequences of greed as part of their definition and define it as the "desire to get more at all costs, including the excessive striving for desired goods and the willingness to accept that such striving may be at the expense of others". On the contrary, Seuntjens, Zeelenberg, Breugelmans, et al. (2015) argue that harming others may be a consequence of greed rather than a core component of its psychology. Zeelenberg et al. (2020) showed that greed can also manifest itself without negative externalities. In my opinion, greedy individuals do not intrinsically want to hurt others, but this is often, though not always, an unintended consequence of their pursuit for more.

The third and final point of discussion is whether a retention motivation (i.e., the desire to hold on to what one has) should also be considered as a defining feature of greed. Most researchers focus solely on the acquisition motivation underlying greed, but some, for example, Lambie et al. (2022) and Krekels (2015, p. 111) include a retention motivation: "to have more you first need to retain what you already have". In a prototype analysis with more than 7,000 participants by Seuntjens, Zeelenberg, Breugelmans, et al. (2015), words like "stinginess", "thriftiness", and "not being generous" were indeed often mentioned by laypeople as part of greed. Items related to this motivation, however, dropped out during the development

of their dispositional greed scale (Seuntjens, Zeelenberg, Van de Ven, et al., 2015). Although I think that a retention motivation can sometimes play a role in greedy behavior, I believe that the acquisition motivation plays a larger role in the experience of being greedy.

In this dissertation, I use the definition of Seuntjens, Zeelenberg, Breugelmans, et al. (2015). Their prototype analysis showed that greed is best defined as the “experience of desiring to acquire more and the dissatisfaction of never having enough” (p. 518). This definition, thus, includes both a desire for more as well as an aspect of insatiability and a frustration of not having what one desires. This definition allows for desires other than monetary and material desires, and does not include a desire that necessarily leads to harm-to-others, or a retention motivation. I chose this definition, because I believe that greed can also be experienced for nonmonetary and nonmaterial desires, negative outcomes for others are often a consequence of greed rather than a necessary condition of greed, and that acquisition, rather than retention, is more central to the experience of greed. In the Discussion, Chapter 7, I will reflect on whether this definition fits the empirical results of Chapter 2-6, or whether another definition would have been more suitable.

Greed is related to, but different from, several other constructs that all operate in the domain of acquisition and wanting more, for example, materialism, envy, and self-interest. Materialism entails a desire for material possessions that signal success in life (Richins, 2004). Greed can be experienced for both material as well as non-material possessions, making greed a broader construct than materialism which solely focusses on the acquisition of material goods. In addition, whilst materialism is felt for things that signal status and success in life, this is not necessarily the case for greed: Someone can, for example, be greedy for candy.

A second construct related to greed is envy. People experience envy when others are better off, whilst they desire that what others have (e.g., Van de Ven et al., 2011). Greed, on the other hand, is simply an insatiable desire for more and not necessarily related to what other people have. Seuntjens, Zeelenberg, Breugelmans, et al. (2015, p. 4) explain that “Envy is thus driven by an external factor (wanting what others have) whereas greed is driven by internal motivations (wanting more).” However, the two constructs can certainly co-occur. Crusius and Lange (2021) found, for example, that dispositional greed predicted more benign as well as more malicious envy. Feelings of envy can be a catalyst of greed (Krekels & Pandelaere, 2015; Seuntjens, Zeelenberg, Van de Ven, et al., 2015), but also the relationship between envy and greed could go the other way around (Crusius & Lange).

Self-interest is another construct closely related to greed. Self-interested individuals are rational agents that care only about maximizing their own outcomes and are indifferent to the outcomes of others (e.g., Luce & Raiffa, 1957; Miller, 1999; Von Neuman & Morgenstern, 1947), whilst greedy individuals do not

deliberately disregard other people's outcomes. A self-interested person, that is, a rational person, knows that enough is enough, but greedy people do not, and continuously strive for more, which leaves them dissatisfied. Striving for more in that sense is not rational anymore. Greedy people, for example, tend to work too hard (and thus forgo leisure time), even when they know that they will earn more than they can use (Zeelenberg et al., 2020), and greedy adolescents save less often and accumulate more debt (Seuntjens et al., 2016), leading to financial problems, which is clearly not in their best self-interest.

How to Measure Individual Differences in Greediness?

The above-mentioned discussion on the core features of greed reflects in the currently available scales to measure individual differences in greediness. To date, there are eight different self-report scales available to assess greed, namely: the Greed Scale (Yamagishi & Sato, 1986), the Greed Avoidance subscale from the HEXACO (Lee & Ashton, 2004), the Greed subscale from the Vices and Virtues Scales (VAVS; Veselka et al., 2014), the Greed Trait Measure (Mussel et al., 2015), two scales called the Dispositional Greed Scale (Krekels & Pandelaere, 2015; Seuntjens, Zeelenberg, Van de Ven, et al., 2015), the GR€€D scale (Mussel & Hewig, 2016), and, the most recent, Multidimensional Dispositional Greed Assessment (MDGA; Lambie et al., 2022). I will briefly introduce these eight greed scales, discuss their convergence, and explain my choice to use the Dispositional Greed Scale developed by Seuntjens, Zeelenberg, Van de Ven, et al. (2015) throughout this dissertation. For an overview of all eight scales and their individual items, and the definition of greed on which they are based, see Table 1.1.

The first greed scale is the 7-item Greed Scale (Yamagishi & Sato, 1986). Their conceptualization of greed, however, equates more with self-interest, and lacks the aspect of acquisitiveness, that is, wanting more, which is part of the current conceptualization of dispositional greed.

The second greed scale is the 4-item subscale Greed Avoidance in the Honesty-Humility Domain from the HEXACO personality measure (Lee & Ashton, 2004), which assesses the avoidance of greed (i.e., low levels of greed). As Seuntjens (2016) correctly noticed, however, measuring greed as its opposite might be problematic as it not clear what the opposite is of being greedy. Is it, for example, being generous or is it being easily satisfied? This scale explicitly concerns (the absence of) the desire for monetary and material goods (e.g., "Having a lot of money is not especially important to me."). It also does not include the aspect of insatiability, which is considered to be a core part of greed.

Table 1.1. Dispositional Greed Scales, the Definition of Greed That They Are Based On, and the Items in the Scale.

Scale	Definition	Items
Greed Scale (Yamagishi & Sato, 1986)	"the belief that it is all right to pursue one's own self-interest" (p. 70)	<ol style="list-style-type: none"> 1. In order to be a successful person in this society, it is important to make use of every opportunity. 2. It is not morally bad to think first of one's own benefit and not of other people's. 3. One should be concerned with the benefit to the group as a whole rather than with one's own benefit. 4. An individual's pursuit of self-interest should be allowed only insofar as it will not jeopardize the public welfare. 5. I like competition. 6. It is very disgusting to exploit other people to further one's own self-interest. 7. There should be more emphasis in school on the kind of education which helps students to be more concerned with the welfare of the society or groups rather than their own individual benefit. I
HEXACO – Greed Avoidance subscale (Lee & Ashton, 2004)	"tendency to be uninterested in possessing lavish wealth, luxury goods, and signs of high social status" (p. 334)	<ol style="list-style-type: none"> 1. I enjoy being a part of exclusive clubs or groups that are not open to everyone. 2. I do not enjoy sharing positions of power. 3. I like to collect expensive things. 4. At work/school, I keep good ideas to myself so that only I can get credit for them in the long run. 5. Financially supporting the less fortunate is a priority for me. 6. Believe that money is essential; friends are replaceable. 7. Being financially wealthy is my number one goal. 8. I consider myself successful if I have a job that pays a lot of money. 9. No matter how much I have, I always want more. 10. "I want it all" would be a good motto for me.
VAVS – Greed subscale (Veselka et al., 2014)	"tendency to manipulate and betray others for personal gain" (p. 76)	<ol style="list-style-type: none"> 1. When I think about all the things I have, my first thought is about what I would like to have next. 2. My actions are strongly focused on material things. 3. Sometimes I feel a real urge to possess something. 4. When something is being shared, I try to get as big a share as possible. 5. In order to get what I want, I can accept the fact that other people may suffer damage. 6. I get the most fun out of buying myself all sorts of things. 7. When I play on my own, I sometimes cheat a little. 1. No matter how much I have of something, I always want more. 2. One can never have enough. 3. Even when I am fulfilled, I often seek more. 4. The pursuit of more and better is an important goal in life for me. 5. A simple basic life is sufficient for me. 6. I am easily satisfied with what I've got.
Greed Trait Measure (Mussel et al., 2015)	"desire to get more at all costs, including the excessive striving for desired goods and the willingness to accept that such striving may be at the expense of others" (p. 126).	
Dispositional Greed Scale (Krekels & Pandelaere, 2015)	"an insatiable desire for more resources, monetary or other" (p. 225)	

Scale	Definition	Items
Dispositional Greed Scale (Seuntjens, Zeelenberg, Van de Ven, et al., 2015)	"the experience of desiring to acquire more and the dissatisfaction of never having enough" (p. 518)	<ol style="list-style-type: none"> 1. I always want more. 2. Actually, I'm kind of greedy. 3. One can never have too much money. 4. As soon as I have acquired something, I start to think about the next thing I want. 5. It doesn't matter how much I have. I'm never completely satisfied. 6. My life motto is "more is better." 7. I can't imagine having too many things.
GREED scale (Mussel & Hewig, 2016)	"desire to get more at all costs" (p. 57)	<ol style="list-style-type: none"> 1. I have great appetite for more. 2. My actions are strongly focused on material things. 3. Sometimes I feel a real urge to possess something. 4. When something is being shared, I try to get as big a share as possible. 5. In order to get what I want, I can accept the fact that other people may suffer damage. 6. My foremost goal is to earn a lot of money. 7. When I play on my own, I sometimes cheat a little. 8. I'm always looking for ways to improve my financial situation. 9. I would stop at nothing to get what I want. 10. It's my ambition to be able to buy myself lots of things. 11. It gives me satisfaction to possess something that other people do not have. 12. I will always try to increase my income and my assets.
MDGA (Lambie et al., 2022)	"multiple dimensions, including (a) excessive desire for more material things and resources, (b) excessive desire for more non-material things, (c) disregard for the cost of obtaining one's desire, (d) insatiability, (e) acquisition motivation (e.g., the desire to acquire more), and (f) retention motivation (e.g., the desire to hold on to what one already has)" (p. 3)	<ol style="list-style-type: none"> 1. It is ok to harm others to get what I want. 2. I want more than what I already have. 3. I am fearful that I might lose everything I have. 4. I accept that I might have to do bad things in order to get the things that I want. 5. My goal is to acquire more than what I already have. 6. I am concerned that I will lose what I have. 7. I will get what I want at all costs, even if I have to lie. 8. I want to acquire more and more. 9. I am afraid that everything I have might be gone one day. 10. I would cheat in order to get what I desire. 11. When I think about what I have, I want more. 12. I worry about losing what I have 13. I am so focused on getting what I want, that I don't think about the consequences. 14. I long for more than what I have. 15. I'm not thankful for what I have. 16. One of my biggest drives is to have more money. 17. I don't think about consequences when pursuing what I desire. 18. I try to get as much as I can of things that I desire. 19. It is hard to be grateful for what I have. 20. I use people to help me get what I want.

The third greed scale is the 70-item Vices and Virtues Scales (VAVS-G) developed by Veselka et al. (2014). This scale assesses the propensity to engage in the seven deadly sins and includes a 10-item subscale that measures greed. Their definition suggests that harm-to-others is intrinsic to greed, but, as pointed out by Zeelenberg et al. (2022), the scale items do not seem to address this element. Even though the notion of striving for more and insatiability are not included in their definition, this is reflected in the scale's items (e.g., "No matter how much I have, I always want more"). This scale contains one reverse-coded item, again raising the question about what the opposite of greed is.

The fourth greed scale is the 7-item Greed Trait Measure (GTM; Mussel et al., 2015). The GTM includes items about the insatiable desire for more (e.g., "When I think about all the things I have, my first thought is about what I would like to have next."), as well as items about cheating and harm-to-others (e.g., "In order to get what I want, I can accept the fact that other people may suffer damage.").

The fifth greed scale is 6-item Dispositional Greed Scale (DGS; Krekels and Pandelaere (2015). Items reflect both acquisition and the insatiability of greed (e.g., "No matter how much I have of something, I always want more"). This is the only scale that does not specifically mention monetary or materialistic desires in any of the items. The scale includes two reverse-coded items.

The sixth greed scale is 7-item Dispositional Greed Scale (DGS; Seuntjens, Zeelenberg, Van de Ven, et al., 2015), which was developed independently and in parallel to the previously mentioned DGS. For these authors, the desire to acquire more is not limited to monetary or materialistic desires, but can also include, for example, a desire for power, sex, or status. They include, however, two items that are specific to the desire for monetary or materialistic objects (e.g., "One can never have too much money"). Other items reflect insatiability, acquisition, and a desire for more (e.g., "As soon as I have acquired something, I start to think about the next thing I want").

The seventh scale, the 12-item GR€€D scale (Mussel & Hewig, 2016), is an extension of Mussel et al.'s (2015) GTM scale. The GTM and the GR€€D scale share 5-items. Similar to the GTM, the GR€€D scale includes a component of harm-to-others (e.g., "I would stop at nothing to get what I want"). This scale also includes items that reflect the insatiable desire for more (e.g., "I have a great appetite for more").

As this dissertation was in its final stages of preparation, Lambie et al. (2022) published the eighth greed scale, the 20-item Multidimensional Dispositional Greed Assessment (MDGA). The multidimensional definition of greed suggested by Lambie and Stickl Haugen (2019) served as the theoretical foundation for the MDGA. They defined six characteristics, but only three factors emerged in the MDGA, namely the insatiable pursuit for more at all costs (e.g., "I am so focused on getting what I want, that I don't think about the consequences"), the desire for more (e.g., "I long for more than what I have"), and, unique to the MDGA, a retention

motivation (e.g., “I worry about losing what I have”). They argued, however, that the MDGA factors combine the six different theoretical dimensions.

Mussel et al. (2018) investigated the convergent validity of the five scales developed between 2014 and 2016 (and used the Greed Avoidance subscale to establish construct-related validity). They found that “despite the conceptual differences, these scales converged on a common latent factor” (p. 249), the scales showed significant correlations with greedy-related behavior (e.g., keeping more for oneself in a dictator and ultimatum game), and are, in general, well suited to measure greed. With regard to correlations with materialism, they found some differences in construct-related validity: The correlation between the GR€€D-scale (Mussel & Hewig, 2016) and materialism (Richins & Dawson, 1992) was significantly higher, than the correlations between the both DGSs (Krekels & Pandelaere, 2015; Seuntjens, Zeelenberg, Van de Ven, et al., 2015) and materialism, which is not surprising since Mussel and Hewig define greed as purely monetary and material desires; whilst Krekels and Pandelaere also allow for nonmaterial desires. No differences in construct-related validity were found between the Greed Avoidance subscale (Lee & Ashton, 2004) and these five greed scales.

Zeelenberg et al. (2022) empirically examined how the same five scales (and their individual items) are related and conclude that “all scales can be used to assess dispositional greed, as all the scales are reliable and correlate highly” (p. 8), and, hence, give no clear recommendation for the use of one scale over another. This implies that there is some consensus about what greed is and how it should be measured. Specifically, a component of insatiability and the desire to attain more is reflected in all five dispositional greed assessments. Zeelenberg et al. note, however, that some items may be deleted from the scales and especially the reversed-coded items, as in Veselka et al. (2014) and Krekels and Pandelaere (2015), did not work well. At further inspection of their results, however, the DGS (Seuntjens, Zeelenberg, Van de Ven, et al., 2015) explained the highest percentage of the variance, and has the advantage that it does not include reverse-coded items.

Throughout the chapters of this dissertation, I make use of the DGS developed by Seuntjens, Zeelenberg, Van de Ven, et al. (2015). I chose this scale for three reasons. First, their definition of greed and the items for this scale were based on a prototype analysis with a large participant pool and also reflects desires that are nonmonetary and nonmaterial (Seuntjens, Zeelenberg, Breugelmans, et al., 2015), which I consider to be a defining feature of greed and deem important for its distinction from materialism. Second, the DGS has been shown to be reliable and valid, stable over time, and predictive of, for example, economic, financial and a variety of immoral behaviors (Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Seuntjens et al., 2016, 2019). Finally, the DGS has been translated and validated in Belarus (Fourmanov & Shirko, 2020), Brazil (Freires et al., 2019), China (Liu, Sun, Ding, et al., 2019), and Japan (Masui et al., 2018), and several of the empirical

findings were replicated in these countries. This makes the DGS the best validated and, at the present, most often used scale to assess individual differences in greed.

Open Questions in Research on Dispositional Greed

Modern greed research started with the, earlier mentioned, comprehensive review of Wang and Murnighan (2011), and this review served as a catalyst for much research on the role of greed in economic and organizational contexts. As we know now, greed is related but distinct from materialism, envy and self-interest (cf. Seuntjens, Zeelenberg, Breugelmans, et al., 2015), and greed is insatiable in the sense that greedy people always want more, even when more is not possible. I have identified several open questions in the literature, which I will address throughout this dissertation.

What are the origins of dispositional greed?

Not everyone is equally greedy. An interesting and partially unanswered question is how these differences in greediness came about and develop over time, that is, the origins of greed. Often, personality traits that are acquired during adolescence are maintained later in life. Various aspects of one's upbringing, like parenting style, unpredictability of the environment, and the availability of resources, might influence how greedy someone becomes. Liu, Sun, and Tsydygov (2019) tested two opposing hypotheses regarding resource availability during childhood and its effect on greed: scarcity hypothesis (i.e., growing up poor is related to greed in adulthood; based on findings of Krekels (2015) and Chen (2018)) and the luxury hypothesis (i.e., growing up rich is related to greed in adulthood; based on the findings of Poluektova et al. (2015) and Lea et al. (1995)). Using a large-scale sample of Chinese adolescents, they found that the richer the environment one grew up in, the greedier one becomes in adulthood. It is unclear, however, whether these findings are generalizable beyond their Chinese sample. Chapter 2 will further explore this relationship and attempt to replicate these results in two different cultures. Parenting practices also have profound impacts on the development of a greedy disposition, meaning that "how parents interact with their children may also foster or restrain the development of children's dispositional greed" (Liu, Sun, Guo, et al., 2019, p. 1). Liu, Sun, Guo and Luo (2019) made the case that mindful parenting can help adolescents develop more positive core self-evaluations and reduce adolescents' greed. They found that embracing mindful parenting enriches adolescents' self-evaluations, which prevent them from becoming greedy.

Is greed also good for something?

Greed is often portrayed in a negative light and people do not aspire to be labeled greedy (e.g., Gilliland & Anderson, 2011), because this label has a very negative connotation. Greed is seen as excessive, wasteful, resulting in accumulation beyond what is needed, and often harmful for other people (e.g., Balot, 2001; Gilliland & Anderson, 2011; Helzer & Rosenzweig, 2020). In economics and evolutionary theory, however, greed is often seen as something positive. Economists, for

example, argue that greed stimulates productivity and economic growth (Bruhn & Lowrey, 2012; Greenfeld, 2001) by motivating the development of new products and industries, which in turn increases employment, wealth, and well-being (Melleuish, 2009; Wight, 2005). The strong desire to maximize outcomes and acquire more, and hence being greedy, might lead to economic activities that will ultimately benefit society as a whole (Oka & Kuijt, 2014). Indeed, in the lab, greedy people work harder and earn more (Zeelenberg et al., 2020), and greedy adolescents earn more money (Seuntjens et al., 2016). According to evolutionary theorist, greed is central to the prospects for survival of mankind (Jett, 2000) and essential for human welfare (Williams, 2000). They suggest, for example, that greedy behavior (e.g., hoarding) provides an evolutionary advantage for those living in environments with scarce resources (Cassill & Watkins, 2004; Robertson, 2001), and hence, it facilitates self-preservation. Notably, both views of greed being bad and greed being good base their evaluation of greed on the effects it has on other people or on society (including the economy) as a whole. Much less is said and known about whether greed is good or bad for individuals themselves. Chapter 3 explores whether there are differences in life success between greedy and less greedy individuals. Such differences are also important for explaining why a trait like greed, that is so widely condemned, may persist over the generations.

Is greed really a cause of financial scandals and crises?

Greed has been mentioned as one of the root causes of financial scandals, such as the Bernie Madoff pyramid scheme (Sarna, 2010), and the 2008 global financial crisis (see, for example, Mazumder & Ahmad, 2010; Papatheodorou et al., 2010). Empirical evidence supporting these strong claims is still relatively scarce. Some initial evidence by Seuntjens et al. (2019) showed that greedy individuals indeed indicated to have engaged in a variety of minor transgressions, such as “evading fare on public transit” or “cheating on a partner”, more often compared to less greedy individuals. They also found such transgressions more acceptable. In the laboratory, greedy participants were more likely to accept a bribe. Li et al. (2021) and Tanner et al. (2022) also found support for the link between greed and corruption. Seuntjens et al. further showed that one reason that greedy people engage more in unethical behavior, such as not returning a wallet and cheating on their partner, is that they are more tempted by the desirable outcomes of such transgressions. Greed has also been linked to the dark triad personality (i.e., narcissism, Machiavellianism, and psychopathy; Sekhar et al., 2020). Furthermore, anomie, that is, “the perception of the disordering of social structures, destruction of social regulations, and breaking down of moral standards” (Jiang et al., 2020, p. 1) which often leads to deviant and antisocial behavior (see, for example, Teymoori, 2016), is positively associated with greed. Chapter 4 and 5 will be devoted specifically to the link between greed and trading behavior in financial asset markets.

What are the social consequences of greed?

Greed potentially affects many aspects of life because it can be experienced over both material and non-material entities (Seuntjens, Zeelenberg, Breugelmans, et

al., 2015). Existing research on greed, however, has mainly focused on material outcomes of economic decisions and behaviors. So far, little is known about the social consequences of greed, for example, the effect of greed in the realm of social relationships. Social contacts and relationships are an important part of people's lives as well as an important predictor of well-being (e.g., Amati et al., 2018; Haller & Hadler, 2006), perhaps even more so than having a good income (Powdthavee, 2008). Previous research has shown that higher dispositional greed is related to lower satisfaction with life (Krekels & Pandelaere, 2015; Li et al., 2021; Masui et al., 2018; Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Zeelenberg et al., 2020), which suggests the possibility that this is in part because greedy people cannot fulfill their desires in the domain of social relationships. Contrary to purchase decisions, social relationships require mutual selection (Newman et al., 2017), meaning that other people need to reciprocate one's desire in order to establish a social relationship (Curtis & Miller, 1986), and there are multiple moments in the formation and maintenance of a social relationship where one of both parties can change their mind. On the one hand, greedy individuals might have different wishes and goals when it comes to social relationships. On the other hand, greedy people may not be the best company, since they are, for example, more self-interested and less empathic (Bao et al., 2020; Seuntjens, Zeelenberg, Van de Ven, et al., 2015). The greediness of a person might, thus, also affect other people's willingness to engage in a relationship with them. Chapter 6 is devoted to this question.

Which situational attributes activate greed?

A greedy motivation does not necessarily always lead to greedy behavior, as such behavior is also subject to a certain context (Wang et al., 2013). Specific situational attributes can create situations in which the greedy disposition is activated and can flourish, or is suppressed (e.g., Ekehammar, 1974; Franken & Muris, 2005). Especially in the light of the 2008 financial collapse, it has been speculated that the following things matter: incentive structure (such as personal performance bonuses; e.g., Ritholtz & Task, 2009; Sajko et al., 2020), prevailing social norms (e.g., Li et al., 2021), an economic mindset (Wang et al., 2011), and whether you are surrounded by other greedy people (e.g., Cardella et al., 2019). Li et al. (2021) found some initial evidence that under low descriptive norms the causal effect of greed on corruption disappears. Inducing an economic mindset (in participants who had little exposure to formal economics education) resulted in more positive attitudes and opinions about greed (Wang et al.). Cardella et al. found that norms of greedy behavior are contagious. Despite recent work, there is still much unknown about which situational attributes can temper and foster greed. The identification of such situational attributes is important for the design of potential interventions to discourage greedy individuals from behaving greedily in circumstances in which their behavior is harmful for themselves or society, and to stimulate greedy behavior when this is actually desirable. Even though this question is not directly investigated in this dissertation, as it focusses on greed as disposition rather than situational greed, some chapters do so indirectly, for example, Chapters 4 and 5 consider a dynamic decision setting (contrary to the

one-shot decision environments that have been investigated so far) and examine what happens when you sort groups of greedy individuals together.

Overview of the Dissertation

This dissertation is divided into three sections. The first section, “Becoming and Staying Greedy”, aims at getting a better understanding on how greed comes about and what it is good for. Chapter 2 is a replication study with large samples and looks at whether people that grew up in relative scarcity or relative luxury tend to be greedier. Chapter 3 examines whether greed leads to economic, evolutionary and/or psychological success, and as a secondary goal compares greed to self-interest. In the second section, “The Greedy Trader”, I investigate in two chapters whether and how greed affects trading behavior. Chapter 4 looks at individual trading behavior in experimental assets markets, and Chapter 5 divides people into markets populated by greedy and non-greedy traders and compares their behavior. Finally, in the third section, “The Greedy Friend”, I consider the social consequences of greed. More specifically, in Chapter 6, I look at the effect that greed has on social relationships.

Please note that even though I was the leading researcher/author on the empirical chapters (Chapters 2 – 6), they are written in the ‘we’ form, since they were a collaborative effort with my co-authors. The Introduction (Chapter 1) and Discussion and Conclusion (Chapter 7) reflect only my own opinions, thoughts, and motivations, and, hence, I use ‘I’ in these chapters. Each chapter is based on an empirical paper that has been either published (Chapter 2 and 4), or under review (Chapter 3, 5 and 6). These chapters can be read as stand-alone papers (and therefore might be somewhat repetitive) or as a combined set of papers.

Section 1: Becoming and Staying Greedy

Chapter 2. Further Tests of the Scarcity and Luxury Hypotheses in Dispositional Greed

Research has shown that many psychological characteristics that are acquired during adolescence, are typically maintained in adulthood (Eccles et al., 2013). It turns out that a key predictor of several adult personality traits is how poor or wealthy people grew up (Griskevicius, Delton, et al., 2011). This chapter seeks to get a better understanding on how individual differences in greed come about. More specifically, it looks at whether people that grew up in relative scarcity (the “scarcity hypothesis”) or relative luxury (“the luxury hypothesis”) tend to be greedier later in life. Previous evidence was mixed, but a recent, large-scale study among Chinese adolescents found support for the later hypothesis (Liu, Sun, & Tsydypov, 2019). The generalizability of these findings may be limited, however, due to China’s one-child policy and socioeconomic policies, which may have led to fewer differences in wealth. Hence, a replication in two other cultural contexts that represent markedly different socioeconomic policies was called for, i.e., the Netherlands (Study 2.1, $N = 2,367$), and the USA (Study 2.2, $N = 999$). The findings

by Liu et al. were mostly replicated with support for the “luxury hypothesis” in both studies.

Chapter 3. Greed: What is it Good for?

A returning question in the literature on greed, in both the philosophical, religious and empirical publications, is whether greed is good or bad (see, for example, Oka & Kuijt, 2014). Especially little is known about whether greed is good or bad for individuals themselves. So, this chapter aims to answer the question, what is greed good for? I look at three indicators of success, namely economic, evolutionary, and psychological success, and use a representative sample of the Dutch population ($N = 2,367$). A secondary goal of this chapter is to disentangle the relationship between greed and self-interest in relation to these indicators of success. The study shows that greedy individuals have more economic success, sometimes more and sometimes less evolutionary success, and less psychological success, than their less greedy counterparts. Greed differed from self-interest in terms of economic success, and partly in terms of evolutionary success. They are similar in terms of psychological success.

Section 2: The Greedy Trader

Chapter 4. Greed and Individual Trading Behavior in Experimental Asset Markets

Greedy bankers and investors have become the culprits of the financial crisis, but empirical evidence for a contribution of greed to trading behavior was long lacking. This chapter presents the result of 15 experimental asset markets in which the influence of greed on individual trading behavior is tested ($N = 127$). Interestingly, I find no support for the idea that greedier investors trade assets fundamentally different from their less greedy counterparts in markets. Even though, these findings cannot be directly generalized to the behavior of (investment) bankers in the financial crisis, the question does arise whether the public opinion was too quick in playing the blame game.

Chapter 5. A Culture of Greed: Bubble Formation in Experimental Asset Markets with Greedy and Non-Greedy Traders

Birds of a greedy feather flock together, meaning that greedy individuals tend to be overrepresented in the financial sector. Chapter 5 investigate the relation between the motive of greed and several asset market indicators such as trading activity and bubble formation by creating 10 markets populated with greedy and 10 markets with non-greedy investors ($N = 162$). Contrary to common suggestions, the findings suggest that greed might not contribute negatively to the emergence of financial crises. If anything, greedy markets might even trade closer to true asset values (i.e., the fundamentals) than non-greedy markets.

Section 3: The Greedy Friend

Chapter 6. Friends as Tools: Dispositional Greed in Social Relationships

Greed can be experienced for both material as well as nonmaterial possessions, including social relationships. In Chapter 6, I investigate how greed is associated with various quantitative and qualitative aspects of social relationships. I make use

of both primary ($N = 205$ and $N = 503$) and secondary ($N = 2299-4943$ and $N = 1816-2341$) survey data. Based on the results of individual studies as well as a meta-analysis on results across studies, I conclude that greed significantly influences greedy people's social lives, as they, for example, experience more feelings of loneliness, have shorter relationships, and objectify their friends more.

Chapter 7. Discussion and Conclusion

In the final Chapter 7, I answer the questions posted in this Introduction, and integrate and discuss the findings from the empirical chapters. I will first give a summary of the key findings and will then discuss the limitations and potential interesting questions for future research and draw an overall conclusion.

Open Science Practices

In this dissertation, I adopt several methods in order to make my research more transparent, reproducible and replicable. For most of the reported studies, I preregistered my hypotheses and analyses (if so, links are provided), and for all of the empirical chapters, materials, data and analyses scripts are available in public repositories, such as the Open Science Framework (OSF) and Research Box. I provide the links to these repositories at the beginning of each chapter. Some of the preregistrations and repositories are blinded, as the corresponding articles are still under review. Once they are made public, the links, unfortunately, might change. Appendices can be found on OSF: <https://osf.io/8trus/>.

SECTION I

BECOMING AND STAYING GREEDY

Chapter 2

Further Tests of the Scarcity and Luxury Hypotheses in Dispositional Greed

This chapter is based on Hoyer, K., Zeelenberg, M., & Breugelmans, S. M. (2021). Further tests of the scarcity and luxury hypotheses in dispositional greed: Evidence from two large-scale Dutch and American samples *Current Psychology*. <https://doi.org/10.1007/s12144-021-02467-z>

A recent, large-scale study among Chinese adolescents found that childhood socioeconomic status (CSES) was positively related to dispositional greed (i.e., the “luxury hypothesis”), instead of negatively related (i.e., the “scarcity hypothesis”; Liu, Sun, & Tsydypov, 2019). This relationship was found for only-children, not for children with siblings. The generalizability of these findings may be limited, due to China’s one-child policy and socioeconomic policies which may have led to fewer differences in wealth. We replicated this research in two other cultural contexts that represent markedly different socioeconomic policies in order to test its generalizability: the Netherlands (Study 2.1), and the USA (Study 2.2). Hierarchical multiple regressions were conducted to test the association between CSES and greed. We mostly replicated the findings by Liu, Sun, and Tsydypov (2019): CSES was positively related to greed in both studies (“luxury hypothesis”) and there was a moderating effect of siblings in Study 2.1, but not in Study 2.2.

- Preregistration (Study 2.2): <https://aspredicted.org/3a4s4.pdf>.
- Materials, data, and analyses scripts: <https://researchbox.org/177>.
- Appendix: <https://osf.io/8trus/>

Greed, the dissatisfaction with what one currently has, combined with the desire to acquire more, is ubiquitous but also evaluated in opposing ways. On the one hand, greed is considered to be an important motivation behind economic growth and prosperity (Greenfeld, 2001); on the other hand, it is considered a sin because of its negative societal outcomes (Bloch, 1984; Tickle, 2004). Individual differences in greed can be reliably measured by the Dispositional Greed Scale (DGS, Seuntjens et al., 2015), and by various other scales (Zeelenberg et al., 2021). Dispositional greed has been associated with various psychological and economic factors as well as negative outcomes (Hoyer et al., 2021; Zeelenberg et al., 2020). Greedy people are morally less sensitive, tend to behave more unethically, find various transgressions more acceptable, and are more corrupt (Li et al., 2021; Seuntjens et al., 2019, Zhang & Xiang, 2021). In addition, they display more psychological entitlement, less empathy, less concern for others and egoism, higher spendthrift, less self-control and higher buying impulsivity; they take more money in dictator and ultimatum games, and contribute less in resource dilemmas (Krekels & Pandelaere, 2015; Li et al., 2019; Seuntjens et al., 2015). Greedy adolescents spend more, save less, and have more debt (Seuntjens et al., 2016). Greed is related to emotional instability, lower self-esteem, and lower life satisfaction (e.g., Liu, Sun, Ding et al., 2019; Seuntjens et al., 2015). To summarize, dispositional greed has been associated with many negative outcomes both to people themselves and to others. For these reasons, it is important to understand how individual differences in greediness come about.

Research has shown that many psychological characteristics that are acquired during adolescence, are typically maintained in adulthood (Eccles et al., 2013). It turns out that a key predictor of several adult personality traits is how poor or wealthy people grew up, and this factor is often expressed in terms of childhood socioeconomic status (CSES; Griskevicius et al., 2011). For example, CSES relates to how much people spend and save as adults (Griskevicius et al., 2013). As a consequence, it seems likely that CSES also relates to how greedy people are later in life. This has indeed been proposed (e.g., Chen, 2018; Krekels, 2015; Poluektova et al., 2015), but there are different views on how exactly this relationship should pan out.

Liu et al. (2019) noted that on the basis of observed findings in the literature, two opposing hypotheses could be formulated on the relation between growing up rich or poor on the one hand, and the level of greed in adulthood on the other. First is the *Scarcity hypothesis*, implying that CSES *negatively* predicts greed. This hypothesis is based on findings of Krekels (2015) and Chen (2018) that children who grew up in disadvantaged environments were greedier in adulthood.

In a study with 198 Amazon Mturk workers, Krekels (2015, p. 62) assessed “childhood and current SES, childhood and current support systems, childhood harsh environments and current uncertainty in life to examine whether there are links between life situations during upbringing and adulthood on the one hand and a greedy disposition on the other hand” and correlated these constructs to Krekels

and Pandelaere's (2015) DGS scale. Out of the 17 constructs measured, 6 correlated with dispositional greed (Krekels, 2015, Appendix A on page 87-88; not correcting for multiple testing). These were mother's education ($r = -.19, p < .01$), mother's job ($r = -.18, p < .05$), subjective ranking ($r = -.18, p < .05$), childhood monetary support ($r = -.21, p < .01$), the occurrence of harsh unpredictable childhood environments ($r = .19, p < .01$), and current feelings of uncertainty ($r = .24, p < .001$).

In a sample with 364 Chinese college students, Chen (2018) examined the relation between dispositional greed (measured via the 7-item-DGS by Seuntjens et al., 2015, the 7-item Greed Trait Measure by Mussel et al., 2015, and the 10-item Greed Subscale of the Virtues and Vices Scale of Veselka et al., 2014), childhood environmental unpredictability (measured using the 5-item Environmental Conditions Scale of Brumbach et al., 2009, and the 3-item Childhood Unpredictability Scale of Mittal et al., 2015), and insecure attachment (measured by Armsden and Greenberg's, 1987 Inventory of Parent and Peer Attachment, that has 5 items for each parent). Chen (2018) found that all three greed scales correlated positively with both childhood unpredictability and both insecure attachment scales (r s between .25 and .37). In the words of Chen (2018, p. 76), this suggests that "greed is a life history strategy adopted in response to an unpredictable environment".

The *Luxury hypothesis*, the opposing hypothesis about how growing up rich is related to greed in adulthood, implies that CSES *positively* predicts greed. This hypothesis is based on the findings of Poluektova et al. (2015) and Lea et al. (1995). Poluektova et al. (2015) found in a study among poor ($N = 157$) and non-poor ($N = 140$) residents of Moscow, that Griskevicius et al.'s (2011) CSES scale related positively ($r = .24, p < .05$) to Seuntjens et al.'s (2015) DGS scale, meaning that participants who remembered being better off in their childhoods also were greedier in their adult lives. Lea et al. (1995) provided more circumstantial evidence and found that people whose parents were relatively well-off, were more likely to have consumer debt and a more materialistic orientation later in life, suggesting that "early experiences are important in consumers' subsequent debt careers" (p. 697).

Liu et al. (2019) reasoned that if childhood scarcity or luxury would impact how greedy people are later in life, this relationship might be moderated by the number of siblings people had when growing up. Growing up with siblings means that one has to share the things that one has with others. If growing up poor is associated with being greedy, having siblings creates more scarcity, and by having even less, one could become greedier later in life (thus, according to the scarcity hypothesis, the effect of CSES will be strongest for people with siblings). In contrast, if growing up rich is associated with being greedy, having siblings would attenuate this effect. If one has a lot and does not need to share this with siblings, one could become greedier (thus, according to the luxury hypothesis, the effect of CSES will be strongest for people without siblings). Liu et al. (2019) conducted a large-scale survey with 3,440 Chinese middle school students (11-19 years old) from various locations in China to examine these competing hypotheses. They

found some support for the luxury hypothesis and not for the scarcity hypothesis: Dispositional greed, as measured by Seuntjens et al.'s (2015) 7-item DGS scale, was positively correlated with growing up wealthy ($r = .04$, $p < .05$), as measured by Griskevicius et al.'s (2011) 3-item CSES scale, for children without siblings. When there was more than one child in a family, no relation between wealth and greed was found.

These initial findings by Liu et al. (2019) are intriguing and important, but as they themselves argued (p. 38): "The generalizability of the findings of the current study should be tested in different countries." Replication is especially called for because Liu et al. (2019) collected data in China, which – as a country – has at least two, very specific characteristics that are relevant to the discussion on the Scarcity Hypothesis and the Luxury Hypothesis. First, it is the only country in the world that has structurally implemented a one-child policy. As a result, the largest group of participants in Liu et al.'s (2019) study had no siblings at all (49.1%), the second largest group had one sibling (37.7%), and only 13.2% percent of the participants had more than one sibling. Hence, Liu et al. (2019) only used two categories in their analyses: participants with siblings and participants without siblings. This dichotomy may not do justice to the effects of having more siblings on adult greed, both for the luxury hypothesis and for the scarcity hypothesis. As resources get shared among more siblings in a continuous fashion, one might expect a continuous moderation, which Liu et al. (2019) could not test for because of the specific characteristics of their Chinese sample.

A second reason for testing the generalizability of Liu et al.'s (2019) findings is that China has long been a communist country. Only relatively recently wide-spread private property and private ownership of companies have been introduced. Thus, substantial differences in wealth among the population are relatively recent and uncommon. This may have had consequences for the way Liu et al.'s (2019) participants rated their Childhood-SES, which explicitly asks about relative status of one's family compared to others.

In short, because we find Liu et al.'s (2019) findings important, we think that the specific Chinese context of their study warrants replications in other contexts. Thus, we set out to closely replicate it in two countries that have a larger variety in the number of siblings and a longer history of capitalism, The Netherlands (Study 2.1) and the United States of America (Study 2.2), also using large samples. Please note that these two countries were chosen because they allowed us to gather data in a close replication of Liu et al. (2019) in contexts that differed on the key issues from China. They were not chosen because they are more or less representative of the world's population for which a more extensive and systematic sampling of countries would be needed. Because we initially had no theoretical reason to favor one hypothesis over the other, the first study was exploratory. For the second study we preregistered (<https://aspredicted.org/3a4s4.pdf><https://aspredicted.org/blind.php?x=xn9g9v>) that we expected support for the luxury hypothesis, that is, a positive correlation between CSES and greed. We report for both studies all

data exclusions, all manipulations, and all measures. The materials, data, and code for both studies can be found on <https://researchbox.org/177>.

Study 2.1

Method

Participants were members of the LISS-panel (Longitudinal Internet Studies for the Social Sciences, for more information www.lissdata.nl), a representative panel of the Dutch population ($N = 2,367$, 51.3% female). Participant ages ranged from 16–95 years old ($M_{\text{age}} = 54.06$, $SD = 17.90$). Prior to the analyses, we excluded 50 participants who did not complete all relevant items of the survey (i.e., the DGS, CSES and the item on family size). Roughly half of the sample filled out the DGS at the beginning of the survey, the other half at the end (and there were no order effects¹). The survey included the following three elements: the 7-item DGS, the 3-item CSES and the 1-item on family size. Participants also responded to some other questions that were for another project concerning prosocial motivation. The survey was administered in Dutch.

As in Liu et al. (2019), the key dependent measure was the 7-item DGS (Seuntjens, Zeelenberg, Van de Ven, et al., 2015). Example items are: “I always want more”, and “It doesn’t matter how much I have, I’m never completely satisfied” (rated on five-point Likert scales). As in Liu et al. (2019), the key predictor variable was the CSES scale (Griskevicius et al., 2011). The three items were: “My family usually had enough money for things when I was growing up”, “I grew up in a relatively wealthy neighborhood”, and “I felt relatively wealthy compared to the other kids in my school” (rated on seven-point Likert scales). The moderator variable was the number of siblings ($M = 2.65$, $SD = 2.29$), what Liu et al. (2019) refer to as family size. This was measured with the question: “How many older [younger] brothers [sisters] do you have?” Participants were instructed to include deceased brothers and sisters. The distribution was as follows: 6.5% had 0 siblings; 30.6% had 1 sibling; 24.7%, 2; 13.2%, 3; 8.7%, 4; 6.0%, 5; 3.3%, 6; 2.5%, 7; and 4.6% more than 8 siblings.

Results and Discussion

The results of Study 2.1 are in line with the luxury hypothesis. Table 2.1 presents the descriptive results and correlations among the variables. As in Liu et al. (2019), childhood socioeconomic status (CSES) was positively related to greed. We note that this correlation is rather small, and should be interpreted carefully. Our data also revealed a significant negative correlation between CSES and the number of siblings (i.e., family size), that was also present in the data of Liu et al. (2019). In addition, the results also showed that males were greedier than females, and that greed was negatively correlated with age, findings that are reported more often

1 The difference between filling out the DGS at the beginning of the survey ($M = 2.03$, $SD = 0.71$) and at the end of the survey ($M = 2.06$, $SD = 0.70$) was non-significant, $F(1,2365) = 0.87$ and $p = .351$.

(e.g., Krekels & Pandelaere, 2015, Liu, Sun, Ding et al., 2019, Seuntjens et al., 2015; Zeelenberg et al., 2020).

Table 2.1. Descriptive Statistics and Correlations Among Childhood Socioeconomic Status, Number of Siblings, Dispositional Greed, Gender and Age (N = 2,367 Dutch Adults) in Study 2.1.

	Range	M	SD	CSES	#Siblings	Greed	Gender
CSES ($\alpha = .82$; $\omega = .82$)	1-7	3.83	1.35	-			
Number of siblings	0-20	2.65	2.29	-.16**	-		
Greed ($\alpha = .90$; $\omega = .92$)	1-5	2.05	0.71	.09**	-.13**	-	
Gender (51.3% female)	0-1			-.03	-.01	.14**	-
Age (in years)	16-95	54.06	17.90	-.26**	.33**	-.37**	.05*

Note: * $p < .05$, ** $p < .001$. Greed was assessed with the DGS (Seuntjens et al., 2015), and CSES with the Childhood-SES scale (Griskevicius et al., 2011). Gender is coded, 0 = female, 1 = male.

We tested the competing Scarcity and Luxury hypotheses in a hierarchical multiple linear regression analysis on the relationship between CSES and DGS, moderated by the number of siblings (following the lead of Liu et al., 2019). In the first step we entered centered CSES and number of siblings; in the second step we added the interaction between centered CSES and number of siblings. Table 2.2 displays the results of these analyses. CSES positively predicted adult greed, and number of siblings negatively predicted adult greed. Furthermore, we found a negative interaction effect, meaning the relationship between CSES and DGS was moderated by number of siblings. The effect was robust to controlling for gender), but not to controlling for both gender and age (see the analyses in Table A2.1, in the online Appendix). The results of simple slope analyses (see right panel of Figure 2.1) showed a significant effect of the CSES on greed for siblings 1 SD below the mean ($b = 0.08$, $SE = 0.02$; $t = 5.31$, $p < .001$), but not for siblings 1 SD above the mean ($b = -0.01$, $SE = 0.02$; $t = -0.41$, $p = .680$). These findings replicate Liu et al. (2019); the relation between CSES and dispositional greed is moderated by the number of siblings (i.e., family size).

Table 2.2. Hierarchical Regression Analysis of Number of Siblings and Childhood Socioeconomic Status (CSES) and Their Interaction (Step 2) on Dispositional Greed (N = 2,367 Dutch Adults) in Study 2.1.

Predictors	Dependent Variable = Dispositional Greed	
	Step 1	Step 2
Constant	2.05* (0.01)	2.04* (0.01)
CSES	0.04* (0.01)	0.04* (0.01)
Siblings	-0.04* (0.01)	-0.04* (0.01)
CSES × Siblings		-0.02* (0.00)
R^2	0.02	0.03
FStatistic	25.26*	22.57*

Note. ** $p < .001$. Regression coefficients (and standard errors). Greed was assessed with the DGS (Seuntjens et al., 2015), CSES with Childhood-SES scale (Griskevicius et al., 2011).

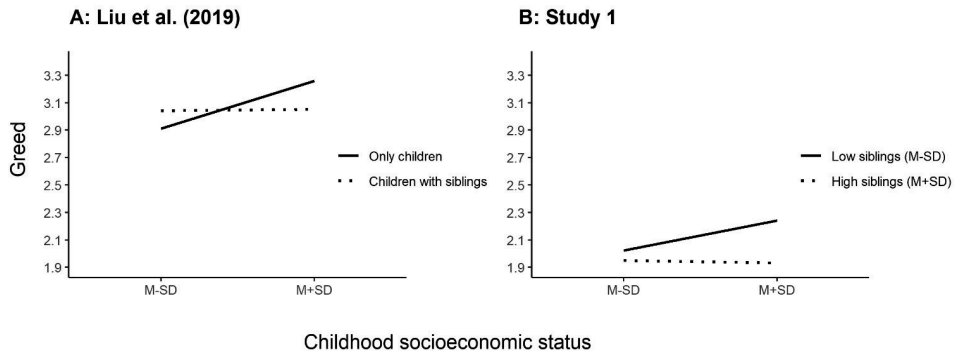


Figure 2.1. Results From A: Liu et al. (2019) and B: Study 2.1 that Show the Moderating Effect of Family Size on the Relationship Between CSES and Greed.

Figure 2.1 shows the results from Study 2.1 next to these obtained by Liu et al. (2019). The figure not only shows that the results of the regression analyses are very similar. It also shows that the absolute level of greediness is higher in the Chinese sample ($M_{\text{only children}} = 3.10$, $M_{\text{children with siblings}} = 2.81$) than in the Dutch sample ($M_{\text{whole sample}} = 2.05$). This could mean a few things. It could be that this is related to the age of the participants. In Seuntjens et al.'s (2016) study with Dutch adolescents, greed scores were also a bit higher ($M = 2.40$). It could also mean that people in China are on average greedier than people in the Netherlands but such interpretations would be conditional upon evidence for full-score equivalence, which we do not have at the moment (cf. Van de Vijver & Leung, 1997). Note, however, that the mean greed score of LISS panel participants is relatively low, as was also the case in Seuntjens et al. (2015). Greed scores of Dutch student samples are generally higher (see the studies with Dutch students in: Seuntjens et al. 2015, 2016; Zeelenberg et al., 2020).

A typical Western European phenomenon (also present in the Netherlands) is a demographic decrease in family size over the past decades, meaning that older generations tend to have more siblings than younger generations. This is indeed reflected in the correlation between age and number of siblings, $r(2367) = .33$, $p < .001$. Hence, we re-examined the effect of family size focusing only on the younger generation (i.e., aged up to and including 35, $N = 455$) and on the older generation (i.e., older than 35, $N = 1912$). For the younger generation, CSES again positively predicted adult greed, but there was no effect of the number of siblings on adult greed, nor was there a significant interaction effect. For the older generation, CSES did not predict adult greed, but there was a negative effect of the number of siblings on adult greed and a negative interaction effect. The results can be found in Table A2.2, in the online appendix.

Study 2.2

Study 2.2 continues our exploration of the relationship between childhood socioeconomic status and dispositional greed, and it is a further replication of Liu et al. (2019), this time with a large sample of US American participants. Based on the findings of Liu et al. (2019), and on the results of Study 2.1, we expect to find support for the luxury hypothesis, such that CSES positively predicts dispositional greed. We also expect family size to moderate the relationship between CSES and greed. We additionally decided to explore the relationship of current socioeconomic status (SES), with childhood socioeconomic status (CSES) and dispositional greed. This would allow us to see if the relation between CSES and dispositional greed would be robust when controlling for current SES.

Method

We recruited 1,000 U.S. participants via Prolific. One participant did not fill out the DGS and was excluded from analysis, leaving a final sample of $N = 999$ (50.1% female, 2.3 % other). Participant ages ranged from 18–89 years old ($M_{\text{age}} = 33.44$, $SD = 12.28$).

The survey included the same three elements from Study 2.1 (the 7-item DGS, the 3-item CSES and the 1-item on family size), plus an additional 3-item SES scale (Griskevicius et al., 2011). As in Liu et al. (2019) and in Study 2.1, the dependent measure was the 7-item DGS rated on five-point Likert scales (Seuntjens, Zeelenberg, Van de Ven, et al., 2015), the key predictor variable was the 3-item CSES scale rated on seven-point Likert scales (Griskevicius et al., 2011), and the moderator variable was the number of siblings ($M = 1.90$, $SD = 1.94$). The distribution was as follows: 13.5% had 0 siblings; 37.0% had 1 sibling; 25.8%, 2; 12.1%, 3; 5.2%, 4; 2.8%, 5; 1.5%, 6; 0.7%, 7; and 1.3% more than 8 siblings. The additional SES scale had the following three items: “I have enough money to buy things I want”, “I don’t need to worry too much about paying my bills”, and “I don’t think I’ll have to worry about money too much in the future.” (rated on seven-point Likert scales).

Results and Discussion

Table 2.3 presents the descriptive results and correlations among the variables. As in Liu et al. (2019) and in Study 2.1, childhood socioeconomic status (CSES) was positively related to greed. This finding is in line with the luxury hypothesis.

The data also again revealed a significant negative correlation between CSES and the number of siblings (i.e., family size), as in Study 2.1. The data also revealed that males were greedier than females, and that greed was negatively correlated with age. These findings replicate earlier findings (e.g., Krekels & Pandelaere, 2015, Liu, Sun, Ding et al., 2019, Seuntjens et al., 2015; Zeelenberg et al., 2020). Childhood-SES correlated positively and significantly with current SES.

As in Study 2.1, we tested the competing Scarcity and Luxury hypotheses in a hierarchical multiple linear regression analysis on the relationship between CSES

and DGS, moderated by the number of siblings. In the first step we entered centered CSES and number of siblings; in the second step we added the interaction between centered CSES and number of siblings. For exploratory purposes we entered centered SES in the third step. Table 2.4 displays the results of these analyses.

Table 2.3. Descriptive Statistics and Correlations Among (Childhood) Socioeconomic Status, Number of Siblings, Dispositional Greed, Gender and Age (N = 999 US Adults) in Study 2.2.

	Range	M	SD	N	CSES	SES	#Sibl.	Greed	Gender
CSES ($\alpha = .85$; $\omega = .85$)	1-7	3.56	1.61	999	-				
SES ($\alpha = .86$; $\omega = .86$)	1-7	3.97	1.59	999	.38**	-			
Number of siblings	0-26	1.90	1.94	999	-.10*	-.07	-		
Greed ($\alpha = .86$; $\omega = .90$)	1-5	2.50	0.88	999	.24**	.09*	-.03	-	
Gender	0-1			976	.13*	.09*	-.08*	.16**	-
Age (in years)	18-89	33.44	12.28	999	.01	.14**	.01	-.11**	.00

Note: * $p < .05$, ** $p < .001$. Greed was assessed with the DGS (Seuntjens et al., 2015). CSES and SES with the Childhood-SES and the SES scale (Griskevicius et al., 2011). Gender is coded: 0 = female, 1 = male.

CSES positively predicted adult greed, replicating Liu et al. (2019) and Study 2.1, supporting the luxury hypothesis. The number of siblings did not predict adult greed. Contrary to Liu et al. and Study 2.1, the interaction effect was non-significant, meaning that we did not find that the relationship between CSES and DGS was moderated by number of siblings. The effect of CSES on greed was robust to controlling for both gender and age (see Table A2.3 in the Appendix). Two participants indicated to have an extremely high number of siblings (i.e., 25 and 26 siblings). Excluding these participants as a robustness check yielded similar results. Furthermore, in our exploratory analysis, we found no additional effect of SES on adult greed. SES did predict greed when entered as single predictor, $\beta = .05$, $t(997) = 2.91$, $p = .004$, $F(1,997) = 8.49$.

Table 2.4. Hierarchical Regression Analysis of Number of Siblings and Childhood Socioeconomic Status (CSES), Their Interaction (Step 2) and Current Socioeconomic Status (SES) (Step 3) on Dispositional Greed (N = 999 US Adults) in Study 2.2.

Predictors	Dependent Variable = Dispositional Greed		
	Step 1	Step 2	Step 3
Constant	2.50* (0.03)	2.50* (0.03)	2.50* (0.03)
CSES	0.13* (0.02)	0.13* (0.02)	0.13* (0.02)
Siblings	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)
CSES × Siblings		-0.01 (0.01)	-0.01 (0.01)
SES			0.00 (0.02)
R^2	0.06	0.06	0.06
FStatistic	31.16*	21.12*	15.83*

Note: * $p < .001$. Regression coefficients and standard errors (in parentheses). Greed was assessed with the DGS (Seuntjens et al., 2015), and CSES and SES with the Childhood-SES and the SES scale (Griskevicius et al., 2011).

General Discussion

The aim of our research was to examine the relationship between the economic circumstances at childhood (i.e., growing up poor or wealthy) and adult dispositional greed. In a large study with Chinese adolescents Liu et al. (2019) found support for the *Luxury hypothesis*, the idea that growing up wealthy would be related to higher levels of dispositional greed in adulthood (based on initial findings of Poluektova et al., 2015, and Lea et al., 1995). Liu et al. did not find support for the competing *Scarcity hypothesis*, the idea that growing up poor would be related to higher levels of dispositional greed (based on initial findings by Krekels, 2015, and Chen, 2018). Liu et al. (2019, p. 38) stated that “It would be beneficial to test our model in other countries in which the number of children per family is generally more diversified.” Thus, we replicated the study in a large-scale, representative Dutch sample (i.e., the LISS panel). We further replicated the study in a large-scale U.S. American sample, via Prolific. Compared to the Chinese adolescent sample used by Liu et al. (2019), both our samples had a larger variety in the number of siblings that people have and came from countries that have a longer history of capitalism, likely resulting in more pronounced differences in wealth experienced when growing up.

Replicating Liu et al. (2019), we found support for the luxury hypothesis in both of our samples. That is, dispositional greed was positively associated with childhood socioeconomic status, implying that the more people reported growing up wealthy, the greedier they were as adults.

We found a moderating role of number of siblings on the relationship between CSES and greed in our Dutch sample in Study 2.1, replicating the second finding of Liu et al. (2019), but we did not find this in the American sample of Study 2.2. More specifically, Study 2.1 found that the positive relationship between greed and CSES was stronger for children with few siblings than for children with more siblings. This suggests that when children grow up with a lot of resources and also do not need to share these with their siblings, they might become greedier later in life. This is in line with the resource dilution model, which postulates that the more children there are in a family, the more resources are divided among offspring (Blake, 1981). However, our data also heed caution to interpreting the relation between greed and family size: The relationship disappeared when analyzing only the younger generation, but the interaction effect was present for the older generation. This disappearance might be driven by the decrease in family size over the past decades in (Western) European societies. In the American sample in Study 2.2, the correlation between age and number of siblings was non-significant, and we also did not find a relation between greed and family size in the results of the regression analysis. This difference in findings concerning the role of family size in our Dutch and American samples might be related to a variety of factors. The USA and the Netherlands represent markedly different political systems and policies, and there are personality differences between both countries (Eigenhuis et al., 2015). We will not speculate here about what specifically might be causing the differences found in our studies, but leave it up to future research to delve

more specifically into the role of the family make-up when growing up in affecting adult greed. Despite this precaution, we do believe that these results together shed initial light on the origins of greed and on the environmental factors that may contribute to the psychological development of greed.

Contrary to Liu et al. (2019), our results from Study 2.1 were not robust to controlling for both gender and age (but they were in Study 2.2). The relationship between greed and age does not seem to be a straightforward one. On the one hand, we did find greed to be negatively correlated with age in both studies, which is consistent with earlier studies on adults cited earlier. On the other hand, Liu et al. found a positive relationship between greed and age, $r(3200) = .14, p < .001$. Interestingly, this is consistent with earlier findings of Seuntjens et al. (2016), who also had adolescent participants, and found that age and dispositional greed correlated positively, $r(3899) = .04, p < .05$. These findings fit with a suggestion by Liu et al. (2019) about an inverted U-shape relationship between greed and age, but our data cannot provide conclusive evidence for such a relationship. Ideally, a future, longitudinal study should investigate the underlying mechanism of differences in greed over the years.

Limitations and Future Research

The replication of the luxury hypothesis suggests two further questions for research into how childhood experiences are related to adult greed. First is the relationship between greed of parents and their children. Greedy parents might create an environment where greed is the norm. In addition, they might deliberately decide to have fewer children (so that they do not have to share their resources), leaving their children with fewer siblings. Second is the possibility for identification and intervention. Given that dispositional greed is likely to develop at an early age and is associated with various harmful and undesirable outcomes later in life (Liu, Sun, Ding et al., 2019; Seuntjens et al., 2016, 2015, 2019; Zeelenberg et al. 2020), Liu, Sun, Guo and Luo (2019) made a case for a mindful parenting intervention to help adolescents to develop more positive core self-evaluations and reduce adolescent greed. They found that embracing mindful parenting enriches adolescents' self-evaluations, which prevent them from becoming greedy.

In this chapter, we closely replicated Liu et al. (2019) and hence, measured CSES with the commonly used scale of Griskevicius et al. (2011). Notably, in several studies subjective assessments of (C)SES were more predictive of decision-making, psychological functioning and health-related factors than more objective indicators (see for example, Adler et al., 2000; Singh-Manoux et al., 2005; Thompson et al., 2020), and empirical evidence has suggested that retrospective reports are accurate (see for example, Brewin et al., 1993; Hardt & Rutter, 2004). Nevertheless, a subjective retrospective scale, such as CSES, does not necessarily reflect the "objective" SES at time of childhood (e.g., the memories of childhood could be prone to change). Thus, it could be informative to follow Krekels (2015) and re-examine the link between greed and CSES using a more objective operationalization of CSES, such as, parental occupation, parental education,

and parental income during childhood. Longitudinal studies could be used to investigate the development of the greedy disposition, and to overcome the limitations of retrospective measurements.

Despite the consistent results regarding the subjective CSES measure and dispositional greed that were found in this research and in Liu et al. (2019), the relation between current SES and dispositional greed is less clear. CSES is often related to SES: Children from low-SES backgrounds are more likely to become low-SES adults, and vice versa (see for example, Chen & Miller, 2012; Brady & Matthews, 2002). Both Krekels (2015) and Seuntjens et al. (2015) found that dispositional greed was unrelated to current income. In the Study 2.2, we found a correlation between current SES and dispositional greed, but SES had no additional effect when Childhood-SES, number of siblings and their interaction were accounted for. Clearly, more research is needed here.

Conclusion

To summarize, using two large-scale adult samples from The Netherlands and the USA, we replicated the main finding by Liu et al. (2019) on the luxury hypothesis of greed. The wealthier children grow-up, the greedier they are in adulthood. In the Dutch sample this was especially if they have fewer, rather than more siblings. In the American sample this was a general effect, independent of the number of siblings. Given the wide-spread relationships between adult greed and a host of economic and psychological outcomes, we believe that these findings are important for our understanding of the early development of economic and social preferences.

Chapter 3

Greed: What is it Good for?

This chapter is based on Hoyer, K., Zeelenberg, M., & Breugelmans, S.M. (2022).
Greed: What is it good for? *Manuscript under review*

What is greed good for? This is an important question, as greed is omnipresent, suggesting some evolutionary benefits, but almost uniformly condemned. In a representative sample of the Dutch population, we examined two main questions. First, we examined whether greedy people had more economic, evolutionary, and psychological success than less greedy people. We adopted the approach that Eriksson et al. (2020) recently used to study the benefits of selfishness. We found that greedy individuals had more economic success, sometimes more and sometimes less evolutionary success, and less psychological success, than their less greedy counterparts. Second, we aimed to disentangle greed from self-interest in relation to these indicators. Here we found that greed differed from self-interest in terms of economic success, and partly in terms of evolutionary success (with greed being slightly more advantageous), but that they are similar in terms of psychological success.

- Preregistration: <https://aspredicted.org/zt27s.pdf>
- Processed data, and analyses scripts: https://researchbox.org/572&PEER_REVIEW_passcode=LLCSOW.
- Raw data and the corresponding code book can be freely downloaded at https://www.dataarchive.lissdata.nl/study_units/view/889.
- Appendix: <https://osf.io/8trus/>

Greed is as intriguing as it is controversial. Across cultures and historical periods greed is considered an important motive and almost equally often has greed been condemned as being immoral, sinful or outright evil (Bloch, 1984; Haynes, 2021; Tickle, 2004). Most people do not want to be called greedy (Gilliland & Anderson, 2011), because it has a negative connotation. Furthermore, greedy people tend to be more dishonest, corrupt, and egoistic (Li et al., 2021; Seuntjens et al., 2019; Tanner et al., 2022). How can a motive that is so universally condemned, at the same time persist over centuries? Are there benefits to being greedy, despite its condemnation and suppression? In other words, is there anything that greed is good for?

We approach this question from a dispositional angle. In recent years, various scales have been developed that reliably and validly measure individual differences in dispositional greed (Krekels & Pandelaere, 2015; Mussel et al., 2015; Mussel & Hewig, 2016; Seuntjens, Zeelenberg, Breugelmans, et al., 2015; Veselka et al., 2014). Although each scale takes a slightly different angle on what greed is, they strongly converge, both conceptually and statistically, on greed being a unidimensional construct centered around the insatiable desire for more (Mussel et al., 2018; Zeelenberg et al., 2022). People differ on this dimension and such differences appear to be naturally distributed in the population (Preston & Vickers, 2014). The availability of these instruments allows us to test whether being greedy relates to being more successful in particular domains of life and to examine what greed is good for.

This chapter presents a study among a representative sample of the Dutch population ($N = 2367$) to test whether dispositional greed relates to economic success, evolutionary success, and psychological success, building on Eriksson et al. (2020) who studied the economic and evolutionary consequences of selfishness. Because greed and selfishness are related constructs, we include a comparison between them. Before turning to the studies, let us explain our approach to greed, its relationship with self-interest, and the predictions for the various types of success.

Greed as Good or Bad

A returning question in the literature on greed, is whether greed is good or bad (Oka & Kuijt, 2014; Verburg, 2022). The case for greed being bad is most frequently encountered: Greed is excessive, wasteful, resulting in accumulation beyond what is needed, and often harmful for other people (Balot, 2001; Gilliland & Anderson, 2011; Helzer & Rosenzweig, 2020; Lambie & Stickl Haugen, 2019). Indeed, research has shown greed to be related to dishonest and harmful behaviors (Li et al., 2021; Seuntjens et al., 2019) as well as to the dark triad of personality (i.e., Machiavellianism, narcissism, and psychopathy; Sekhar et al., 2020). This may be one of the reasons why all major religions condemn greed as being immoral, sinful or evil (Bloch, 1984; Tickle, 2004).

Greed has also been associated with specific, immoral behaviors (Bauhr, 2017; Burke, 2009). For example, greed has been named as the root cause of the 2008 global economic crisis (Gilliland & Anderson, 2014), employee theft (Caudil, 1988), corrupt mortgage lending (Morgenson & Rosner, 2011), white collar crime (L. Wang et al., 2019), and the fraud at Enron (Sarna, 2010). In addition, greed is named a source of interpersonal conflict (Hoffman et al., 2018). In sum, there is a clear case to be made for views of greed as being bad.

Views of greed being good may be less salient in the psychological literature, but they are by no means less important. In economics, for example, greed is argued to stimulate productivity and economic growth (Bruhn & Lowrey, 2012; Greenfeld, 2001), and to motivate the development of new products and industries, which in turn increases employment, wealth, and well-being (Melleuish, 2009; Wight, 2005). Research indeed found that greedy adolescents generate more income (Seuntjens et al., 2016), and that – in the lab – greedy people work harder and earn more (Zeelenberg et al., 2020). Similar arguments have been made by evolutionary theorists, such as “the acquisitive nature of mankind is absolutely central to his prospects for survival.” (Jett, 2000, p. 11). Greed is argued to be essential for human welfare (Williams, 2000), and to facilitate self-preservation because greedy behaviors (e.g., hoarding) provide an evolutionary advantage for those living in environments with scarce resources (Cassill & Watkins, 2004; Robertson, 2001). Thus, there is a case to be made in which greed is good.

It is important to note that both views of greed, being bad or good, base their evaluation of greed on the effects greed has on other people or on society as a whole. But is greed good or bad for individuals themselves? We believe this question is also relevant. Are there differences in life success between greedy and less greedy individuals? If so, these may explain why greed, despite being widely condemned, persists over generations. Unless we adopt a group selection perspective (cf. Nowak et al., 2010), whereby groups with more greedy individuals outcompete groups of less greedy individuals, the persistence of a trait could be explained by the benefits it confers on the inclusive fitness of the individual. In the present research, inspired by Eriksson et al. (2020), these potential benefits are economic success, evolutionary success, and psychological success. Before venturing into these types of success, we first explain what greed is and how it can be measured.

Greed

Research on the dynamics of greed increased substantially over the last decade, catalyzed by Wang and Murnighan’s (2011) comprehensive review of ideas from economics, politics, philosophy, history, game theory and psychology. Wang and Murnighan found many synonyms for greed, like avarice, covetousness, gluttony or ambition, and argue that greed “takes different forms when it is directed towards different goals” (p. 282). They concluded that despite the long intellectual history

of greed, empirical greed research was rare, probably due to the lack of consensus on how to define greed. Without resolving greed's definitional problems, they adopted Balot's (2001) definition: "an excessive desire to get more... a primarily materialistic type of desire." (p. 282). Wang and Murnighan inspired modern greed research, including the development of scales to assess dispositional greed (for overviews see Mussel et al., 2018; Zeelenberg et al., 2022).

The recent increase in research led to consensus on the desire to acquire being a defining feature of greed, often referred to as an *excessive* desire (e.g., Mussel et al., 2015; Wang et al., 2011) or an *insatiable* desire (e.g., Seuntjens, Zeelenberg, Breugelmans, et al., 2015). Differences can be found in whether, and if so which, additional features are seen as part of greed. For example, there is discussion on whether a definition of greed should include desires other than those that are monetary or material in nature. Some, like Bruhn and Lowrey (2012, p.138), define greed narrowly as "the inordinate need for the acquisition of materialistic wealth". Others, like Krekels and Pandelaere (2015, p.225) refer to "the insatiable desire for more resources, monetary or other".

Another discussion is whether harm-to-others is intrinsic to greed. Perceivers base their judgments of agents' greed not only on its acquisitiveness, but also on the degree to which this behavior results in harm-to-others (Helzer & Rosenzweig, 2020). Some researchers explicitly include the negative consequences of greed as part of their definition. For example, Mussel et al. (2015; p. 126) define greed as the "desire to get more at all costs, including the excessive striving for desired goods and the willingness to accept that such striving may be at the expense of others", whilst others argue that harm-to-others may be a consequence of greed rather than a core component of its psychology (Seuntjens, Zeelenberg, Breugelmans, et al., 2015).

A third debate is whether retention motivation, next to acquisition, should be considered part of greed. Most researchers focus solely on the acquisitive part of greed, but some also include a retention motivation: "to have more you first need to retain what you already have" (Krekels, 2015, p. 111). Stinginess and not being generous showed up in a prototype analysis of greed by Seuntjens, Zeelenberg, Breugelmans, et al. (2015), but items measuring these elements dropped out during the development of their Dispositional Greed Scale (Seuntjens, Zeelenberg, Van de Ven, et al., 2015). Items on retention were included as a separate dimension (next to the insatiable pursuit for more at all costs and a desire for more) in a recent multidimensional greed scale by Lambie et al. (2022).

Thus, the excessive or insatiable desire to acquire more is the defining feature of psychological greed. There is still discussion on the extent to which greed generalizes beyond material goods, on whether greed includes harm-to-others, and on whether greed also includes a retention motive.

Greed is clearly related to materialism, envy and self-interest (e.g., Krekels, 2015), as all reflect wanting more. Materialism entails a desire for material possessions in order to signal success in life (Richins, 2004). Greed is not necessarily felt for outcomes that signal success or status (Seuntjens, Zeelenberg, Van de Ven, et al., 2015), and can also be experienced for non-material outcomes such as sex, food or power. Moreover, greed is insatiable, whilst materialistic desires can be satisfied once the object of desire is acquired (Mussel & Hewig, 2016). This makes greed a broader construct.

Envy is felt when others are better off whilst we do not feel they deserve it (Van de Ven et al., 2011). Greed, in contrast, can be unrelated to what others have. "Envy is thus driven by an external factor (wanting what others have) whereas greed is driven by internal motivations (wanting more)" (Seuntjens, Zeelenberg, Breugelmans, et al., 2015, p. 4). The two constructs can co-occur. Crusius and Lange (2021) found that dispositional greed predicts more envy.

Most important for our current purposes is self-interest, that we will compare with greed in more detail later on. Self-interested individuals care only about their own outcomes (in contrast to other people's outcomes). Greedy individuals are similar, but mostly motivated by the insatiable desire to get more; more than is needed and sometimes even more than is possible. This constant striving for more and dissatisfaction with what they have means that greedy individuals may act in ways that are not rational (Seuntjens, Zeelenberg, Van de Ven, et al., 2015; TerBush, 2021). As a case in point, greedy individuals tend to work too hard, even when they know that they cannot possibly enjoy all the fruits of their labor (Zeelenberg et al., 2020). Greedy people thus forgo leisure time by working harder than is needed and earning more than they can use, which is clearly not in their best self-interest.

The above-mentioned discussions are reflected in the scales to measure individual differences in greediness. In the last decade, various self-report scales have been published: the Greed Avoidance subscale from the HEXACO (Lee & Ashton, 2004), the Greed-subscale from the Vices and Virtues Scales (Veselka et al., 2014), the Greed Trait Measure (Mussel et al., 2015), two Dispositional Greed Scales (Krekels & Pandelaere, 2015; Seuntjens, Zeelenberg, Van de Ven, et al., 2015), the GR€€D scale (Mussel & Hewig, 2016), and the Multidimensional Dispositional Greed Assessment (MDGA; Lambie et al., 2022). Yamagishi and Sato (1986) also published a Greed Scale, but their conceptualization equates it with self-interest, dealing "with the belief that it is all right to pursue one's own self-interest" (p. 70), while it lacks the central aspect of acquisitiveness.

Mussel et al. (2018) investigated the convergent validity of the five scales developed between 2014 and 2016, and found that "despite the conceptual differences, these scales converged on a common latent factor" (p. 249). All scales also correlated with greedy-related behavior. Zeelenberg et al. (2022) compared the same scales and concluded that "all scales can be used to assess dispositional greed, as all the scales are reliable and correlate highly" (p. 8). Though some scales

include items specific to material and monetary possessions, or harm-to-others, none of the scales, except the recent MDGA (Lambie et al., 2022) include items on retention. Thus, there is strong convergence in measures of dispositional greed, that all include items relating to the insatiable desire for more, which is central in definitions of greed given by most researchers.

In our research we use the Dispositional Greed Scale (DGS; Seuntjens, Zeelenberg, Van de Ven, et al., 2015), which is most commonly used. It is reliable, valid, stable over time, and predictive of a wide variety of relevant social, economic, and financial behaviors. The DGS has been translated and validated for use in various countries, such as Brazil (Freires et al., 2019), China (Liu, Sun, Ding, et al., 2019), Japan (Masui et al., 2018), and Belarus (Fourmanov & Shirko, 2020).

Self-Interest and Success in Life

In this chapter, we translate the question as to what greed is good for to the question whether dispositional greed relates positively to success in life. This approach was inspired by Eriksson et al. (2020), who studied how self-interest relates to economic and evolutionary outcomes. They noted that theories in economics and evolutionary biology emphasize the power of self-interest, but that clear empirical support for such views in the psychological literature was lacking. They also noted that, interestingly, there was some empirical research showing that being self-interested resulted in worse outcomes.

Selfish motivation, in the research of Eriksson et al. (2020, p. 532), was defined “as the inverse of (prosocial or) otherish motivation: wanting or striving to benefit the self without regard for the well-being of others”. Accordingly, selfishness or self-interest was measured with a 3-item Prosocial Motivation scale, with selfishness being indicated by a low score on this scale². Using data from large community samples, they found that selfish individuals (i.e., people with a low prosocial motivation) had a lower personal as well as household income than prosocial individuals³ and that they also had fewer children. They concluded that self-interested individuals are economically and evolutionary worse-off than prosocial individuals.

We think these findings are also relevant for the question as to what greed is good for. Though not identical, selfishness and greed are clearly related constructs, at least in most popular views. Nevertheless, on the basis of theoretical analysis, we expected greed to have different relationships with indicators of success than selfishness. In order to explain these expectations, we first explain which indicators

2 This is an interesting observation because some other research on self-interest and other-interest found that these constructs are not necessary opposites and even correlate slightly positively (Gerbasí & Prentice, 2013).

3 The relationship that Eriksson et al. (2020) reported was not strictly linear, which we address in the results section.

of success we employed and what the similarities and differences between greed and selfishness are.

According to Duckworth et al. (2012, p. 1), we can define success both objectively and subjectively: "Objective success entails doing well according to some common metric uniformly applied to all individuals in a society, whereas subjective success concerns an individual's personal assessment of his or her life situation." From an evolutionary perspective, objective success could be indicated by increased inclusive fitness: the amount of (fertile) offspring people have (Moreno, 2010). From a societal perspective, objective success could be indicated by earnings and wealth. Subjective, psychological success, could be indicated by life satisfaction (i.e., the overall appraisal of one's life; Diener et al., 1985). Though objective and subjective indicators of success are distinct, they are typically correlated. More income increases life satisfaction when it means avoiding poverty and this effect becomes smaller once basic needs are met (Diener & Biswas-Diener, 2002). Life satisfaction increases with the number of children until the third child, especially for married people (Angeles, 2010). At an aggregate level both objective indicators are negatively related: as countries become richer their fertility rate tends to decline, and within countries there is also a negative correlation between household income and fertility (Schultz, 2006).

Given the work on life success, we deemed a combination of objective indicators of evolutionary and economic success and subjective indicators of psychological success to provide the best answer to the question what greed is good for? These indicators include those used by Eriksson et al. (2020), income and offspring. For evolutionary success we included additional indicators of life history strategies (MacArthur & Wilson, 1967): number of sexual partners and the duration of the longest romantic relationship. Having multiple sexual partners increases the chance of having more and more genetically diverse offspring while investing fewer resources in each (an r-strategy); having longer romantic relationships limits the number of offspring but invests more resources in each, increasing their probability of surviving to adulthood (a k-strategy). For subjective, psychological success, we added the "Satisfaction-with-Life" scale (Diener et al., 1985), which is the most widely used and validated indicators of subjective psychological well-being. Together, these indicators should allow us to address what greed is good for, but also to what extent greed differs from self-interest.

Greed and Self-Interest

Greed and self-interest are intrinsically related. Both constructs refer to a desire to obtain outcomes for oneself. For example, a leading dictionary describes greed as the "*selfish and excessive desire for more of something (as money) than is needed*" (Merriam-Webster Online Dictionary, n.d., italics added). Some even argued that greed should be seen as "*a selfish motivation to acquire an unfairly excessive amount of a resource, at the expense of others.*" (Cardella et al., 2019, p. 580, italics

in the original). A prototype analysis of greed indeed found that self-interest was among the most frequently mentioned features of greed (Seuntjens, Zeelenberg, Breugelmans, et al., 2015).

Adam Smith (1759, 1776) is well-known for praising the benefits of self-interest, but may be less well-known for having a very negative opinion about greed (which he refers to as avarice), expressed both in "Theory of Moral Sentiments" and in "Wealth of the Nations". In the latter, Smith (1776, p. 305) wrote: "Avarice and injustice are always short-sighted" and he discussed many examples of how greedy behavior would hurt the wealth of businessmen. According to Smith, greed does not equal self-interest because greed disregards the welfare of others, and could even work against the self-interest of people. In subsequent work, both in economics and in psychology, greed and self-interested have been treated as distinct constructs.

The assumption of self-interest in standard economic theory refers to agents maximizing their own outcomes without taking the outcome of others into account (e.g., Luce & Raiffa, 1957; Von Neuman & Morgenstern, 1947). Similarly in psychological theory, self-interest refers to a stronger weighting of own outcomes than of other people's outcomes (e.g., Van Lange et al., 1997). In contrast, the axiom of greed in economic theory refers to agents always preferring more of a desirable good compared to less (Lea et al., 1987). Similarly in psychological terms, greed has been defined as the "dissatisfaction of not having enough, combined with the desire to acquire more" (Seuntjens, Zeelenberg, Van de Ven, et al., 2015, p. 928). Thus, while self-interest is defined in terms of a comparison between self and others, greed does not necessarily involve other people. This means that greed may relate to an increased interest in others, such as greedy individuals preferring to have more social contacts and sexual partners.

While self-interest in economics is considered to be rational (i.e., leading to maximal utility for the individual) greed is not (TerBush, 2021). For example, Zeelenberg et al. (2020) found that greedy people worked harder, at the expense of enjoying leisure time, even when the outcomes of their work could not be consumed. This phenomenon of over-earning (earning more than one need or can consume) has an impact on the satisfaction experienced over increased income. Using data from the US General Social Survey, Okulicz-Kozaryn et al. (2021) found that indicators of greed were associated with lower life satisfaction, and that this effect was about half the size of the positive effect of income on life satisfaction.

Of course, greed and self-interest are also related. Self-interest is most often assessed in terms of people's Social Value Orientation (SVO; Murphy et al., 2011; Van Lange et al., 1997). The SVO framework assumes that "people vary in their motivations or goals when evaluating different source allocations between themselves and another person" (Murphy et al., 2011, p. 771). Seuntjens, Zeelenberg, Van de Ven, et al. (2015) found in two different samples ($N_1 = 167$, $N_2 = 237$) that self-interest (via both SVO-measures) and greed (via the DGS) correlated

significantly but low, between .12 and .21. We expected that greed and self-interest have different relationships with measures of economic, evolutionary, and psychological success (see top of Table 3.1).

Hypotheses

With regard to economic success, we expected a positive relationship between greed and income, although current findings are mixed. Seuntjens, Zeelenberg, Van de Ven, et al. (2015) found no relationship in a sample of adults, but Seuntjens et al. (2016) found greed to be associated with higher income in a sample of adolescents. Van Muijen and Melse (2015) found no relationship for younger respondents (i.e., younger than 36), but did find a negative relationship for older respondents (i.e., older than 35). Interestingly, for specific occupations such as sales managers, they found a positive relationship between greed and income. Greedy sales managers earned on average 10% more than middle-income (i.e., about €3,000). At the same time, they found that respondents with an above-average greed score mainly worked in fields such as sales and finance. Following the reasoning of economists that greed is good for economic growth, and that greed has been empirically linked to overearning (Zeelenberg et al., 2020), we hypothesized that greed is positively related to personal and household income. We also expected to replicate Eriksson et al.'s (2020) finding that selfishness is negatively related to personal and household income.

With regard to evolutionary success, we expected that greedy individuals have fewer children and shorter relationships, but more sexual partners. These expectations follow from two possibly opposing effects of greed. On the one hand, the drive to always want more that is typical for greed, might also be reflected in a drive to want more children. In addition, previous research has shown that the desire to acquire more, which is core to the definition of greed, also manifests itself in a desire for as many casual sexual partners as possible (Seuntjens, Zeelenberg, Van de Ven, et al., 2015). This desire might be so strong that it motivates greedy individuals to (temporarily) invest more in their social relationships in order to attain this goal. Furthermore, greedy individuals indicated a stronger desire to cheat on their partner and were more easily lured into this behavior (Seuntjens et al., 2019). However, on the other hand, whether greedy individuals actually manage to reach these goals depends on the willingness of other people to engage with them. Being greedy is not generally looked well upon and greed correlates with a variety of negative personality traits, like egoism and meanness (Mussel & Hewig, 2016; Seuntjens, Zeelenberg, Van de Ven, et al., 2015). Thus, we expected both greed and self-interest to be negatively related to long-term indicators of evolutionary success, namely the number of biological children and the length of the longest romantic relationship, but positively to a more short-term indicator, number of sexual partners. Furthermore, we expected to replicate Eriksson et al. (2020) who found that selfish individuals had fewer children than prosocial individuals.

With regard to psychological success, greed has been found to be related to lower psychological well-being, since it leads to more emotional instability, lower self-esteem and lower satisfaction with life (Krekels & Pandelaere, 2015; Li et al., 2021; Masui et al., 2018; Okulicz-Kozaryn et al., 2021; Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Zeelenberg et al., 2020). Hence, we expected to find that both greed and self-interest are related to lower psychological well-being. A recent review revealed that a prosocial motivation is positively related to psychological well-being, physical health, and social relationships (Crocker et al., 2017). This implies that being selfish would have negative consequences for psychological success. Data were collected in May 2019. This study was preregistered⁴ via https://aspredicted.org/ZF9_57V. Processed data⁵ and code can be found on: https://researchbox.org/572&PEER_REVIEW_passcode=LLCSOW.

Table 3.1. Summary of Hypothesized (top) and Empirical (bottom) Relations between Greed and Self-interest and Measures of Success.

	Measure	Economic Success		Evolutionary Success		Psychological Success	
		Personal Income	Household Income	Biological Children	Longest Relationship	Sexual Partners	Satisfaction with Life
Hypothesized relations	Greed	↑	↑	↓	↓	↑	↓
	Self-interest	↓	↓	↓	↓	↓	↓
Empirical relations	Greed	○	↑	↓	↓	↑	↓
	Self-interest (PM)	○	○	↓	↓	○	○
	Self-interest (SVO)	○	↓	○	↑	○	↓

Note: ↑ indicates a significant ($p < .05$), positive relation; ↓ indicates a significant, negative relation; ○ indicates no significant relation. Greed refers to the Dispositional Greed Scale (Seuntjens, Zeelenberg, Van de Ven, et al., 2015), PM refers to the prosocial motivation measure (Eriksson et al., 2020) and SVO refers to the Social Value Orientation measure (Murphy et al., 2011), all coded such that higher scores indicated a more greedy and a more prosocial orientation.

Method

Participants

Participants ($N = 2,367$, 51.3% female, age range 16-95, $M_{\text{age}} = 54.06$, $SD = 17.90$) were members of the Dutch nationally representative LISS (Longitudinal Internet Studies for the Social Sciences) panel⁶. Following the preregistration, we excluded 50 participants who did not complete all key scales (i.e., the DGS, Prosocial Motivation scale and SVO-slider). N varies across the indicators of success,

⁴ The preregistration includes two additional variables: Childhood Socioeconomic Status (CSES; Griskevicius et al., 2011) and number of siblings, that were used for another project.

⁵ Raw data and the corresponding code book can be freely downloaded at https://www.dataarchive.lissdata.nl/study_units/view/889.

⁶ For more information www.lissdata.nl.

depending on the responses. Roughly half filled out the DGS at the beginning of the survey, the others at the end⁷. The survey was administered in Dutch.

Measures

In addition to the administered scales, we included a number of demographic measures that are available for the LISS-panel members (such as income, age and gender). Individual differences in DGS were measured with the 7-item DGS (Seuntjens, Zeelenberg, Van de Ven, et al., 2015). Example items are: "I always want more", and "It doesn't matter how much I have. I'm never completely satisfied" (1 = *Strongly disagree*, to 5 = *Strongly agree*).

Self-interest was assessed with two different scales measuring individual differences in how much people care about themselves and others. The first was the 3-item Prosocial Motivation scale of Eriksson et al. (2020). The items were: "People should be willing to help others who are less fortunate", "Personally assisting people in trouble is very important to me", and "These days people need to look after themselves and not overly worry about others" (rated 1 = *Strongly disagree* to 4 = *Strongly agree*). For the present purposes this was coded such that a higher score reflected more selfishness (and thus a lower prosocial motivation). The second was the more commonly used SVO-slider (Murphy et al., 2011), that comprises of six decomposed games. An SVO score was computed for each subject following the procedure specified in Murphy et al. For the present purposes this was coded such that a higher score reflected more selfishness (a more proself and less prosocial orientation).

Economic success was assessed by two gross monthly income variables that were both available from the LISS panel: personal⁸ and household income, both in Euros and imputed.⁹ Data from two extreme outliers with personal monthly incomes above €440,000, whilst not being (self)employed, were excluded from the analysis.

Evolutionary success was assessed by three questions. The first question was adopted from Eriksson et al. (2020) and asked about the number of biological children (including deceased children). The second question asked about the length of the longest romantic relationship in years and months (data from six participants were excluded because they indicated a relationship length greater than their age). The third question asked about the number of sexual partners during their lifetime.

Psychological success was assessed by the 5-item Satisfaction-with-Life scale (SWLS, Diener et al., 1985). Example items are: "In most ways my life is close to

7 We found no order effects on the DGS ($p = .351$), $M_{\text{start}} = 2.03$ and $M_{\text{end}} = 2.06$.

8 Personal income also includes income from sources other than employment, such as social securities and pensions. In our sample, 1083 respondents reported to be either employed or self-employed. Notably, greedy individuals are more likely to be employed than their nongreedy counterparts, $r(2367) = .13$ with $p < .001$.

9 The imputation procedure can be found on www.lissdata.nl.

ideal" and "I am satisfied with my life" (rated 1 = *Strongly disagree*, to 7 = *Strongly agree*).

Results

The results are summarized in the bottom panel of Table 3.1. Table 3.2 shows the means, standard deviations, and scale reliabilities of all relevant variables, and the correlations of greed and with the two self-interest measures (that were positively correlated). Dispositional greed correlated positively with both measures of self-interest: prosocial motivation and social value orientation. The greedier people were, the more self-interested they were.

All three measures also correlated with gender. Males were greedier and more self-interested on both measures. We also observed a negative correlation between greed and age, indicating that the older people were, the less greedy they were. Age was differently correlated with the two self-interest measures. Age was negatively correlated with self-interest measured as prosocial motivation, suggesting that older people are less self-interested. But age was positively correlated with self-interest measured as social value orientation, suggesting that older people are more self-interested.

Table 3.2. Means, Standard Deviations, of all Measured Constructs and Correlations with Greed, Prosocial Motivation and Social Value Orientation

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3
1. Greed ($\alpha = .90$; $\omega = .92$)	2367	2.05	0.71			
2. Self-interest (PM; $\alpha = .69$; $\omega = .70$)	2367	2.11	0.49	.26***		
3. Self-interest (SVO)	2367	27.31	9.41	.13***	.23***	
4. Age	2367	54.06	17.90	-.37***	-.07***	.08***
5. Gender (0 = female, 1 = male)	2367	0.49	0.50	.14***	.11***	.09***
Economic Success						
6. Personal monthly gross income (Euros)	2244	2380	1988	-.01	.02	-.04
7. Household monthly gross income (Euros)	2165	4573	2834	.07***	.03	-.08***
Evolutionary Success						
8. Number of biological children	2367	1.47	1.26	-.19***	-.08***	-.00
9. Duration longest relationship (years)	2118	25.49	17.81	-.26***	-.05*	.05*
10. Number of sexual partners	1909	4.72	10.46	.08***	.02	.02
Psychological Success						
11. Satisfaction with Life ($\alpha = .91$; $\omega = .93$)	2367	4.91	1.19	-.14***	-.03	-.07**

Note. Greed was assessed with the 7-item Dispositional Greed Scale (Seuntjens, Zeelenberg, Van de Ven, et al., 2015); Prosocial Motivation (PM) was assessed with the 3-item measure from Eriksson et al. 2020; Social Value Orientation (SVO) was assessed with the 6-item SVO Slider (Murphy et al., 2011). Higher scores indicated a more prosocial orientation; Satisfaction with Life was assessed with Diener et al.'s (1985) 5-item Scale. α refers to Cronbach's alpha, ω refers to McDonald's omega. * $p < .05$. ** $p < .01$. *** $p < .001$.

Economic Success

Greed correlated positively with household income, but not with personal income¹⁰. In contrast to findings by Eriksson et al. (2020), self-interest measured as prosocial motivation did not correlate with personal and household income. Self-interest measured as SVO did correlate negatively with household income, but not with personal income. Thus, at the household level, greedy individuals earn more and self-interested individuals earn less, but at the individual level no such differences emerge.

For a further exploration, we followed Van Muijen and Melse (2015), and split up our data into two age groups: younger than 36 years, and older than 35 years. We found no significant relationship for younger respondents for personal income, $r(429) = -.09$, $p = .063$, and household income, $r(406) = .07$, $p = .138$. For older respondents, we found greed to be positively related to both personal income, $r(1815) = .08$, $p < .001$, and household income, $r(1759) = .06$, $p = .015$. This pattern of results thus does not replicate what Van Muijen and Melse found.

Evolutionary Success

Greed correlated negatively with the number of (biological) children. For self-interest the findings were mixed; there was a negative correlation between self-interest measured as prosocial motivation and biological children, replicating Eriksson et al. (2020), but there was no a significant correlation for self-interest measured as SVO.

For relationship length, the greedier people were, the shorter their relationships were. For self-interest, we again found different results for the two measures; self-interest measured as prosocial motivation correlated negatively with relationship length, but self-interest measured as SVO correlated positively with relationship length.

Greed correlated positively with the number of sexual partners. Contrary to the predictions, we found no significant correlation between both self-interest measures and the number of sexual partners.

Psychological Success

Greed correlated negatively with well-being, replicating earlier findings (Krekels & Pandelaere, 2015; Li et al., 2021; Masui et al., 2018; Okulicz-Kozaryn et al., 2021; Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Zeelenberg et al., 2020). For the two self-interest measures, the results were mixed. SVO correlated negatively with well-being, while PM and well-being were uncorrelated.

¹⁰ Notably, for the subset of participants who receive income from either employment or self-employment (and excluding the 12 participants who reported zero income despite being employed), there is a slight positive relationship between greed and personal income, $r(1012) = .06$, $p = .048$.

Partial Correlations

To further differentiate between greed and self-interest, we looked at the partial correlations of both constructs with the various indicators of success. Results can be found in Table 3.3. We found that greed and self-interest independently relate to household income and subjective well-being. Furthermore, we found that greed related to indicators of evolutionary success, when controlling for self-interest, but that the effects of self-interest disappeared when controlling for greed.

Exploratory Analyses

We observed significant correlations between our measures for greed and self-interest and age and gender (see Table 3.2). On the basis of the literature, we did not have predictions regarding these correlations; thus, following the preregistration, we explored the partial correlations between greed and self-interest and the indicators of success while controlling for age and gender. Doing so reduced the number of significant correlations. This was mostly due to controlling for age because controlling for gender did not affect the significance of relationships between greed and the various indicators of success. The negative relationship between greed and life satisfaction remained after controlling for age and gender, $r(2367) = -.15$ and $p < .001$. The positive relationship between greed and number of sexual partners became marginally significant, $r(1909) = .04$ and $p = .080$. For SVO, after controlling for age and gender, there was a significant negative relationship with life satisfaction, $r(2367) = -.07$ and $p < .001$, and household income, $r(2165) = -.07$ and $p < .001$. Interestingly, the negative relationship with personal income became significant, $r(2244) = -.09$ and $p < .001$. For Prosocial Motivation, a significant negative relationship with number of biological children remained, $r(2367) = -.04$ and $p = .031$. The other significant relationships disappeared.

Table 3.3. Partial Correlations of Greed, and Self-Interest Measured as Prosocial Motivation (PM) and Social Value Orientation (SVO) with Measures of Economic, Evolutionary and Psychological Success.

Variable	N	Greed		Self-interest (PM)	Self-interest (SVO)
		Controlling for self-interest (PM)	Controlling for self-interest (SVO)	Controlling for greed	Controlling for greed
Personal monthly gross income (Euros)	2244	-.02	-.01	.02	-.03
Household monthly gross income (Euros)	2165	.07**	.08***	.01	-.09***
Number of biological children	2367	-.17***	-.19***	-.03	.02
Duration longest relationship (years)	2118	-.26***	-.27***	.02	.09***
Number of sexual partners	1909	.07**	.07**	.00	.01
Satisfaction with Life	2367	-.13***	-.13***	.01	-.05***

Note. Greed was assessed with the 7-item Dispositional Greed Scale (Seuntjens, Zeelenberg, Van de Ven, et al., 2015); Prosocial Motivation (PM) was assessed with the 3-item measure from Eriksson et al. 2020; Social Value Orientation (SVO) was assessed with the 6-item SVO Slider (Murphy et al., 2011). Higher scores indicated a more prosocial orientation. Satisfaction with Life was assessed with Diener et al.'s (1985) 5-item Scale. ** $p < .01$. *** $p < .001$.

For completeness and in order to compare our results directly to those reported by Eriksson et al. (2020), we also ran the analyses of the General Social Survey (GSS) data as presented in their Study 1 (these analyses were not preregistered)¹¹. The full procedure and results are reported in Appendix 3.1. Results stayed the same: replicating Eriksson et al., number of children was positively related to prosocial motivation; not replicating Eriksson et al., neither personal income nor household income were related to prosocial motivation

Discussion

What is greed good for? In view of the widespread recognition of greed as an important motive driving human behavior, its widespread historical and contemporary condemnation, and its prominence in economic theory, we deemed this to be an important question. In a representative sample of the Dutch population, we studied relationships between greed and a number of indicators of economic, evolutionary and psychological success, similar to the approach that Eriksson et al. (2020) recently used to study the benefits of selfishness. We examined whether individual differences in dispositional greed (assessed by the Dispositional Greed Scale of Seuntjens, Zeelenberg, Van de Ven, et al., 2015) related to personal and household income (economic success), to number of biological children, sexual partners and duration of romantic relationships (evolutionary success), and to life satisfaction (psychological success). For comparison, we performed similar analyses for self-interest (assessed via both the Prosocial Motivation scale of Eriksson et al., 2020, and the SVO-slider of Murphy et al., 2011). What did we find?

With the exception of personal income, which we will come back to later, all (preregistered) hypothesized correlations with greed were found: being higher in dispositional greed correlated with having a higher household income and having had more sexual partners, and with having fewer children, shorter lasting romantic relationships and having lower well-being. Importantly, these patterns are different from those of self-interest, where fewer significant relationships were found and where, with the SVO-measure, there was a negative correlation with household income and a positive correlation with length of romantic relationships. Greed and self-interest (measured as Prosocial Motivation) were similar in their negative relation with the number of children. The general picture that emerges is that dispositional greed may be good for the purposes of acquisition, but that in a contemporary Western society, in this case the Netherlands, it confers few other benefits. This largely negative view of greed aligns well with the general condemnation of greed as a sin and with the undesirability of being called a greedy person. However, at closer scrutiny the results may hint at a more nuanced picture.

¹¹ We thank Irina Vartanova for providing us with the code for their analyses, so that we could replicate it with our data.

To start with economic success, the data show a mixed picture: greedier people did not have a higher personal income than less greedy people, but they did report a higher household income. As was discussed in the introduction, findings on dispositional greed and personal income in previous studies have been mixed, with both positive and negative relationships being found for specific age or occupational segments of the population and no relationships found for others (Seuntjens et al., 2016; Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Van Muijen & Melse, 2015). Interesting in this regard is that in their study among 120.000 Dutch employees, Van Muijen and Melse did report positive relationships for specific occupations such as sales managers, where greedy individuals earned substantially more than their less greedy coworkers. This could suggest that the economic benefits of greed are dependent on the specific situation people find themselves in. In areas like sales and finance, which tended to attract a larger proportion of greedy individuals in Van Muijen and Melse's study, being greedy can lead to higher personal income, but in other occupations such as education or social work being greedy may actually be counterproductive. Personal income can come from various sources, such as employment, social benefits, and pensions. Interestingly, exploratory analysis revealed that, once (self)employed, there is a slight positive relationship between greed and personal income suggesting that greed may indeed be beneficial for personal income in specific situations (i.e., employment). Over all sources of personal income together, however, our data shows a net null effect of personal income.

The positive relationship between greed and household income could go different ways. It might be that greedy individuals contribute to higher household income by, for example, stimulating their partners to work harder, or it could be that greedy individuals select partners that are economically better off, or it could be that there is a third variable, such as greedy individuals taking care of fewer children which contributes to household income because both partners can work more. Context effects may also be important in this regard. Recently, evidence has been found that growing up in more wealthy circumstances relates to higher greed at a later age (Hoyer, Zeelenberg, et al., 2021; Liu, Sun, & Tsydypov, 2019). Thus, it might be that the opportunities that the environment presents breeds higher greed which in turn creates a later preference for environments that are more conducive to greed. Of course, such mechanisms are mere conjecture at the time, but we feel that the question as to when (rather than whether) greed is related to more income is worthy of further attention. It is also interesting that we did not find a relation between self-interest and personal income, but that SVO selfishness showed a negative relation with household income, suggesting that there is something specific to greed in this regard.

With regard to evolutionary success, the data suggest that greedy people are more likely to follow an r-strategy (MacArthur & Wilson, 1967), having more sexual partners but less long-lasting relationships. In contemporary societies, this may lead to having fewer children, as is evident in our data. However, like the economic success this effect may be dependent on context. In other social or historical

circumstances, an r-strategy may actually lead to having increased reproductive opportunities by having more sexual partners, and as a possible consequence, more genetically diverse offspring. From a more psychological perspective there may also be other reasons why greedy people have fewer children. It could be a deliberate choice but also the result of unsuccessful mating. Parenting involves sacrificing time, attention, and resources to the family, which might go at the cost of pursuing one's own needs and interests. In addition, greedy individuals may not be the most attractive candidates to have children with. Greedy individuals are, among other things, more egoistic and more likely to cheat on their partners (Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Seuntjens et al., 2019), which might be one of the reasons why they have had shorter romantic relationships. In either case, our data do suggest that dispositional greed transcends mere material goods and acquisitions in that it is related to different ways in which people approach relationships as well. Indeed, this was also suggested by Hoyer et al. (2022), who found that, among other things, greedy individuals objectify their friends more and feel less close to them.

With regard to psychological success our data are quite clear and very much in line with previous research (Krekels & Pandelaere, 2015; Li et al., 2021; Masui et al., 2018; Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Zeelenberg et al., 2020); higher dispositional greed was related to a lower satisfaction-with-life. This could be an intrinsic property of greed. The constant dissatisfaction of never having enough and the endless pursuit of more which are core characteristics of greed may by necessity imply lower life satisfaction in general. Greedy people tend to focus not on what they have, but rather on what they do not yet have or on what other people have (i.e., malicious envy; Crusius & Lange, 2021). The relationship could also be more indirect, with greedy people being less satisfied with life due to the fact that, for example, their relationships are shorter lasting or their families are smaller. Having good social relationships is crucial to well-being (e.g., Amati et al., 2018), even more so than having a good income (Powdthavee, 2008), and it seems that being greedy does not help one to have a stable social network.

A secondary goal of this study was to compare greed with self-interest. The reason for including this comparison was twofold. First, self-interest and greed are clearly related constructs, both theoretically and empirically. Second, the design of our study was inspired by the study of Eriksson et al. (2020), who studied the economic and evolutionary success of selfishness, thus providing a clear benchmark for our study of greed. For a complete comparison, we not only used the Prosocial Motivation Scale that was used by Eriksson et al. to measure selfishness, but also the more commonly used SVO-slider (Murphy et al., 2011). Both measures gave slightly different results.

When comparing the bivariate correlational results, it is notable that greed and selfishness share many of the negative relationships, although selfishness shows overall fewer significant relationships. One notable difference is the relationship with household income, which is positively related to greed but negative to self-

interest. A second difference is the relationship with duration of the longest romantic relationship. Greed was related to shorter romantic relationships, but for selfishness effects differed according to scale: selfishness measured by Prosocial Motivation was negatively correlated with relationship length, but selfishness measured by SVO was positively correlated. This makes the interpretation of the difference complicated. A third difference is that greed was positively related to the number of sexual partners whereas there was no significant relationship with self-interest. Thus, being greedy appears to be somewhat more advantageous than being selfish, both economically and evolutionarily.

Because greed and self-interest were correlated, we also looked at partial correlations. Here, unique effects of greed and self-interest remain, albeit only for the SVO measure. When it comes to greedy and selfish individuals having fewer children, the partial correlation suggests that this effect can be explained by greed, rather than selfishness. The same counts for the negative correlation with relationship length of the Prosocial Motivation measure. The positive correlation of the SVO measure with relationship length remains. Also, the negative correlation with life-satisfaction remains for both greed and self-interest measured by SVO, suggesting that being greedy and being selfish make you unhappy in their own way.

Taken together, these results clearly show the usefulness of distinguishing between greed and self-interest when it comes to studying economic, evolutionary, and psychological outcomes. All in all, greed appears to have positive and negative relationships with measures of success, whereas selfishness tends to be negative across the board.

Like any study using correlational, cross-sectional panel data, there are limitations to the current design, and the results raise many more questions on what greed is good for. Still, we believe that this research provides insights into the factors that may affect the strength of greed and opens up avenues for intervention. Ideally, a future, longitudinal study should investigate the underlying mechanism of differences in greed in socioeconomic success over the years. The results for income already suggested that there might be differences over the course of one's life. Furthermore, future research could investigate why the greedy have lowered evolutionary success by examining the mating practices of the greedy. Finally, future research should investigate why greedier individuals feel less satisfied with life, in order to design interventions to increase their mental well-being and reduce possible severe side effects such as depression.

A second limitation that would warrant more future research is the observation of a relatively strong correlation between greed and age in our data. When we explored the effect of age as a control variable many relationships between greed (as well as self-interest) and measures of success were no longer significant. Given the limited literature on such effects, it is hard to provide a strong interpretation as to what this means. However, there are a number of findings that we think may be important in this regard. Both Liu, Sun, & Tsydypov (2019) and Hoyer et al.

(2021) speculated that a relationship between age and greed might be curvilinear, following an inverted U-shape. This would mean that greed reaches a maximum in early adulthood. In favor of such a relationship are findings of a positive correlation between greed and age with adolescent samples (e.g., Liu, Sun, & Tsydypov, 2019; Seuntjens et al., 2016), and findings of negative relationships with adult samples (e.g., Liu, Sun, Ding, et al., 2019; Seuntjens, Zeelenberg, Van de Ven, et al., 2015). With regard to self-interest, we found somewhat mixed evidence: Age correlated positively with self-interest measured with SVO but negatively with self-interest measured with Prosocial Motivation. The literature seems to be more in line with the latter, suggesting that people become more prosocial later in life (e.g., Matsumoto et al., 2016). Van Lange et al.(1997) refer to this phenomenon as the *prosocial-growth hypothesis*. Van Lange (2000) suggests four possible explanations for the effect. First, people over time realize that a prosocial orientation has functional aspects. Second, people also become more dependent on others once they get older. Third is a cohort explanation: over the past decades Western societies have become more urban and less collectivistic, which may explain why more mature individuals have a more prosocial orientation. Fourth, the life expectancy of prosocials might be longer and people with a prosocial orientation may therefore be more prevalent among older age groups, for example, because they developed healthier social ties (and thus have more access to social support). In short, it would appear to be worthwhile to further investigate the relationships among greed, self-interest and age, especially from a developmental, longitudinal perspective.

Let us return to the question that motivated the current research, is there anything good about greed? Despite the clear condemnation of greed in philosophical, religious, and popular writings, our results show that greed is (somewhat) beneficial for economic success (supporting claims put forward by some economists). However, our results show that greed is mixed for evolutionary success and detrimental for psychological success. A secondary goal of this study was to disentangle the relationship between greed and self-interest. On the basis of the current findings, we can say that greed and self-interest differ in their relation to economic success, and are mostly similar in their relation to evolutionary success (with greed being somewhat more advantageous), and well-being. In short, greed may be good for your income but bad for your happiness.

SECTION II

THE GREEDY TRADER

Chapter 4

Greed and Individual Trading Behavior in Experimental Asset Markets

This chapter is based on Hoyer, K., Zeisberger, S., Breugelmans, S. M., & Zeelenberg, M. (2021). Greed and individual trading behavior in experimental asset markets. *Decision*, 8(2), 80–96. <https://doi.org/https://doi.org/10.1037/dec0000149>

Greed has been shown to be an important economic motive. Both the popular press as well as scientific papers have mentioned questionable practices by greedy bankers and investors as one of the root causes of the 2008 global financial crisis. In spite of these suggestions, there is as of yet no substantive empirical evidence for a contribution of greed to individual trading behavior. This chapter presents the result of 15 experimental asset markets in which we test the influence of greed on trading behavior. We do not find empirical support for the idea that greedier investors trade fundamentally different from their less greedy counterparts in markets. These findings shed light on the role of greed in trading and the emergence of asset market bubbles in specific, and of the financial crisis in general.

- Preregistration: <https://aspredicted.org/88nb7.pdf>.
- Materials, data, and analyses scripts: <https://osf.io/gqmk7/>.
- Appendix: <https://osf.io/8trus/>

There seems to be a wide-spread consensus that greed is related to negative economic effects. For example, it is regularly argued that greedy bankers and investors are one of the root causes of the 2008 global financial crisis, that greed has led to several cases of fraudulent actions or that it increases economic inequality (e.g., Wang & Murnighan, 2011). Notwithstanding the widespread public debate on negative effects of greed for society (Gilliland & Anderson, 2014), academic work on greed as a driver for these effects is relatively underdeveloped.

Psychological greed is measured as a self-reported disposition to be greedy and defined as “the desire to acquire more and the dissatisfaction of never having enough” (Seuntjens, Zeelenberg, Breugelmans, et al., 2015, p. 14). Greed is a motivational drive: Some people are generally more motivated by greed than others. This excessive desire for more, which is fundamental to greed, often motivates people to engage in (excessive) acquisitive behavior, which we refer to as greedy behavior. It is of course possible that this greedy behavior is not motivated by greed itself, but elicited by other motives or situational factors, such as, for example, simple need or scarcity. Greed has, however, been found to relate to different aspects of economic behavior. For example, greedy individuals report investing more in financial products in general and in stocks and savings accounts in particular (Mussel & Hewig, 2016). They tend to have higher spendthrift, less self-control and higher impulsivity (Li et al. 2019; Seuntjens, Zeelenberg, Van de Ven, et al., 2015), indicating that the strong desires associated with greed are difficult to control. Greedy people work beyond what is needed, and overearn (Zeelenberg et al., 2020). They take more and contribute less in economic games, such as ultimatum games, dictator games and resource dilemmas (Seuntjens, Zeelenberg, Van de Ven, et al., 2015) and are more willing to accept bribes and engage in unethical behavior (Seuntjens et al., 2019). Exposure to economics education has been associated with a more favorable attitude towards both greed in general as well as one’s own greed, and has also been associated with greedy behavior in a dictator game (Wang et al., 2011). In a large-scale study among more than 120,000 employees, greed was related to working in high-wage professions; dispositional greed was higher for people working in extractive industries, real estate and banking, and lower for people working in education, social work, and healthcare (Van Muijen & Melse, 2015). Similarly, Krekels and Pandelaere (2015) found that people working in financial and management sectors are on average greedier than people in other professions. People scoring high on greed also score high on productivity orientation (Krekels & Pandelaere, 2015), meaning that they strive “to use time productively, make progress, and reach accomplishments” (Keinan & Kivetz, 2011, p. 935). Hence, greed appears to be a fundamental motive in economic behavior both in economic and in psychological theories.

Recently, greed has been directly related to stock market volatility, the emergence of financial bubbles and ensuing financial crises. Wall Street folklore states that two factors move financial markets and explain investors’ behavior: fear and greed (e.g., Nofsinger, 2018). Fear makes investors focus on events that are unfavorable, while greed makes them focus on events that are favorable (Shefrin, 2002). The

famous business magnate Warren Buffett advised stock market investors to take advantage of this observation and to be “fearful when others are greedy and greedy when others are fearful” (Buffett, 1987). Questionable practices by greedy bankers and investors have often been mentioned as one of the root causes of the 2008 global financial crisis that led to, among other things, increased unemployment and business and country defaults. The lower the stock market price became, especially after the collapse of the asset bubble, the more news articles were written about greed and its destructive consequences for society (Gilliland & Anderson, 2014). Former US president Obama (2009) openly called for a financial reform in order to better protect society from the reckless greed and risk-taking of “Wall Street wrongdoers” and the Dalai Lama (2009) stated that the crisis was driven by “unlimited human greed”. The destructive actions of bankers were assumed to be motivated by personal greed instead of a drive to act in their clients’ best interests. This perceived greed of bankers and traders motivated political action and public protest. The public was outraged by the apparent corporate greed (Dayno, 2018). As a result, citizens from all over the world took to the streets to protest greed in the Occupy movement at the end of 2011.

Interestingly, in spite of these suggestions and accusations, there is as of yet no substantive empirical evidence for a contribution of greed to the emergence of financial bubbles or individual trading behavior in financial markets. Particularly, in many papers the relationship between greed and market behavior is treated as a given and rarely tested. For example, Munasinghe (2010, p. 4) refers to a “greed-driven asset bubble”, Suranovic (2010, p. 1) mentions the “decisive role played by unmitigated greed” and Boddy (2011, p. 258) speaks of “Corporate psychopaths, who probably caused the crisis by their self-seeking greed”. The claim is that greedy investment and commercial bankers took too many unnecessary risks and behaved recklessly with their clients’ money in order to ensure greater turnover to satisfy their personal greed, which ultimately led to the financial crisis.

To summarize, many sources suggest that there is a relationship between greed and asset market behavior, but we are not aware of any direct empirical evidence supporting such suggestions. Here, we present the first direct test of such a relationship, also contributing to the discussions of how greed might contribute to the emergence of asset market bubbles. This study primarily focuses on individual trading behavior by student participants in a series of experimental asset markets. We do not (yet) study the behavior of bankers and stockbrokers, but chose to more generally examine how greed would potentially impact individual trading behavior. Hence, the set-up of our study is potentially different from actual banking trading behavior, which might prevent us from making claims about the causes of the financial crisis. The study examines the potential impact of greed in market settings. More specifically, we present the results of experimental asset markets in which we can cleanly test the effects of greed on individual trading behavior in a competitive market environment. To that end, we use a contemporary experimental asset market design based on Weitzel et al. (2020) and analyze whether and to what extent greedier traders differ in their investment behavior

from their less greedy counterparts. This design is also used as it has been shown to produce asset market bubbles, allowing us to analyze different market situations in one market. Overall, we do not find empirical support for the idea that greedier investors trade fundamentally different. Hence, we cannot identify that greed contributes to a more aggressive trading behavior, increase in market volatility or emergence of asset market bubbles.

The Current Study

Given the apparent consensus that greed is related to economic behavior in general and to investment behavior specifically, it is reasonable to ask why this relationship has not been studied before. One reason could be that studying the relationship between greed and market behavior is complex. We identify at least three complications. A first complication, at least with respect to asset market bubbles, is that often we only know of the occurrence of an asset market bubble in real asset markets after the crash is observed, if at all (Kujal & Powell, 2017). The term 'bubble' refers to a situation in which the price (e.g., for an asset or a house) exceeds its fundamental value (hereafter: FV), and thus, represents inefficient prices. FVs are usually not observable in data from financial markets and researchers may disagree on whether a bubble has occurred, even in hindsight. As a result, empirical tests of market efficiency and bubbles suffer from the joint hypothesis problem: Simultaneous tests of efficiency and a set of assumptions regarding fundamentals (Powell & Shestakova, 2016; Weitzel et al., 2020), hence the contribution of greedy individuals to such bubbles is challenging. A second complication is that in economic studies, greed is often defined in terms of behavior and little attention is paid to the motives underlying this behavior. In other words, it is an observed construct. When observing behavior such as jumping the bandwagon when asset prices are rising (Lussange et al., 2019; Rapp, 2015), taking more than is rationally needed (Razen & Stefan, 2019), or engaging in risky or even reckless behavior (Yu, 2019) the inference that such behavior is due to the motive of greed is only one of many that could be made. In order to study the effects of the motive of greed, this motive should be assessed independently of the behavior that it is supposed to explain. A third complication, already alluded to above, is that many complex behaviors, such as trading on the stock market, are overdetermined, in the sense that they may actually stem from a set of different factors or mechanisms that operate jointly and independently. For trading behavior, an obvious alternative explanation to a motive of greed would be risk preferences. Many accounts of greed imply that its detrimental effect on markets are caused by the fact that greedy people take excessive risks to satisfy their personal greed, thereby accepting negative external effects such as enormous losses for society (Mussel et al., 2014). There may also be other confounding factors that are hard to control in real market situations.

Our study takes advantage of recent methodological developments in the study of asset market and greed to overcome above indicated complications. More

specifically, we study experimental asset markets, including a measure of the motive of greed, controlling for a set of other motives, including risk preferences. Experimental asset markets have the advantage over real asset markets that they occur in a controlled laboratory setting, where FVs are defined and price deviations can easily be observed (e.g., Bloomfield & Anderson, 2010). This results in more internal validity and better causal inference. Research about laboratory bubbles finds its origins in an experimental asset market design introduced by Smith, et al. (1988; hereafter SSW). This baseline SSW market has formed the basis for many replications and manipulations (Palan, 2013), and has contributed to furthering our understanding of bubbles and market inefficiencies. Given the findings of Kirchler et al. (2012) that participants may be confused by the concept of a declining FV over time as in the SSW design, we employ a constant (risk-neutral) FV that helps to reduce or eliminate confusion about the FV and the role it plays in bubble formation. Specifically, in our study, we mimic the experimental design of Weitzel et al. (2020), based on Smith et al. (2014) and Holt et al. (2017). This design employs a number of features that are comparatively close to features in real-world financial markets, such as dividend and interest payments. Brunnermeier and Schnabel (2016) found that many historic bubbles in the last 400 years were preceded or accompanied by various forms of capital inflow. This design allows for real-world like bubble-drivers such as capital inflows that increase the cash to asset-value ratio¹² (CA-ratio) over time (Kirchler et al., 2012; Razen et al., 2017). An increasing CA-ratio provides liquidity to the market.

We use the experimental asset market to study the effect of greed at an individual level. In other words, we are interested in how individuals who score higher or lower on dispositional greed engage in trading and ordering (including pricing) behavior in such markets. A number of recent studies have made use of experimental asset markets to also study individual behavior. For example, individual market behavior has been related to individual differences in risk aversion, loss aversion, cognitive ability, personality types like extraversion and neuroticism, and different trader types (Breaban & Noussair, 2015; Cueva & Rustichini, 2015; Janssen et al., 2019; Oehler et al., 2018). In our hypotheses, we focus on the individual level but in our analyses, we will report on individual as well as market level indicators, such as measures for mispricing, overvaluation and potential bubbles (cf. Razen et al. 2017; Stöckl et al. 2010), to relate to previous studies that are based on market analyses.

Given its recent applications, we measure individual differences in the motive of greed by the Dispositional Greed Scale (DGS; Seuntjens, Zeelenberg, van de Ven, et al., 2015). The DGS has been shown to be reliable and valid, stable over time and predictive of a wide variety of relevant behaviors in US American and Dutch samples. It has further been translated and validated in Brazil, China, Germany, Japan, and Russia (e.g., Chen, 2018; Freires et al., 2019; Liu et al., 2019; Masui et al.,

12 The CA ratio is calculated as the total amount of cash in the asset market over the product of shares outstanding and their risk-neutral FV, that is, total expected value of outstanding payments of the assets.

2018; Poluektova et al., 2015). See Mussel et al. (2018) for a comparison between the DGS and four other self-report measures to assess greed.

To disentangle greed from other individuals' characteristics, we include a host of control variables, the most notable being self-reported and lottery-incentivized risk preferences and loss aversion in particular. Although it is often suggested that there is a link between the greedy disposition and individual risk-taking, contradictory findings have been reported [see for example Seuntjens, Zeelenberg, Van de Ven, et al. (2015) and Mussel et al. (2015)]. Hence, it is important that it is controlled for. Other control measures that can influence market behavior included risk perception, illusion of control, self-reported financial literacy and their belief about others' financial literacy (motivated by Cheung et al., 2014), financial experience, age and gender (Eckel & Füllbrunn, 2015).

Previous literature particularly demonstrated that greed correlates with more productivity orientation, less self-control, more (buying) impulsivity and spending more money on financial products (Krekels & Pandelaere, 2015; Li et al., 2019; Mussel & Hewig, 2016; Seuntjens, Zeelenberg, Van de Ven, et al., 2015). Given these findings, our preregistered hypothesis (AsPredicted: #17643, <https://aspredicted.org/88nb7.pdf>) is that individuals scoring high on dispositional greed (i.e., the motive of greed) act out their greedy inclinations by showing higher levels of market activity compared to less greedy individuals. Market activity is characterized by trading and ordering behavior, and it can come from both, buying as well as selling decisions. We expected that the strong desire to acquire more along with above mentioned findings drives greedy individuals to trade and order more assets than individuals scoring low on greed. This desire can be focused on either the acquisition of assets or the acquisition of capital. We explore whether such behavior was driven by buying or selling trades and orders, whether greedier individuals operate at different price levels (i.e., contribute to market inefficiency and bubbles) and whether they are more profitable. Due to the interactive nature of experimental assets markets (i.e., to account for both hierarchical data and repeated measures), we use three-level multilevel analyses (and two-level where appropriate) to examine trading, ordering and pricing behavior. In order to disentangle the effect of greed from other variables that might drive the effect, we control for various socio- demographic characteristics of traders.

Method

We ran an initial study with psychology students as participants ($N = 154$; 74.7% women; $M_{\text{age}} = 19.79$, $SD = 1.97$), in which we had 15 experimental asset markets. We used a market design with a constant FV and increasing CA ratio over time for this study, similar to other studies (e.g., Weitzel et al., 2020), but with a few differences in parameterization and interest rate. In this initial study we did not find support for the idea that dispositional greed influences trading and ordering behavior. The specifics of this study (Method and Results) can be found in the

online supplementary materials (Appendix 4.1). We chose not to report that study in full here, because many participants indicated verbally at the end of the study to be unfamiliar and uncomfortable with the trading paradigm, and they indicated that they had a hard time understanding it. Indeed, the markets showed quite some unexpected trading behavior (e.g., switching around price and volume when ordering assets and the absence of bubble-like patterns). This is the reason why we decided to rerun the study with more numerically eloquent participants that are familiar with thinking in terms of markets and trading, namely economics and management students. This also allowed us to utilize a more sophisticated market design that better resembles real-life trading. This is the study reported in full here. Notably, the average score on the dispositional greed scale of the initial study with psychology students ($M = 2.41$, $SD = 0.54$) was significantly lower than that of the current study with economics and management students [$M = 2.98$, $SD = 0.62$; $t(279) = 8.17$, $p < .001$], which is in accordance with the literature discussed in the introduction. The variance of individual greed scores, which is most relevant to our study to analyze individual trading behavior, is slightly higher in the economics and management student sample (measured in SD). We will come back to the results of the initial study in the Discussion section.

For our current study, we ran 15 experimental asset markets with groups of 7-10 predominantly economics and management students from Radboud University Nijmegen in a controlled lab setting¹³. Each individual participated in only one market and had not previously traded in similar markets. Participants were recruited for 1 h and 45 min sessions and received an average payout of €19.66 ($SD = €5.19$) which corresponds to an hourly rate of approx. €11.23. Every session consisted of a survey and a subsequent market phase. Overall, we have a total sample of $N = 127$ participants (43.3% women; $M_{\text{age}} = 21.41$, $SD = 2.93$).¹⁴

Participants were seated behind identical laptop computers with partition walls on all sides. In the first phase of the study, participants completed a survey. This survey included a consent form, individual measures (more details below) and demographics. After all participants in the session completed the survey, the second phase of the study started: The experimental market phase. Participants were randomly allocated to an experimental asset market and participated in a post-market survey, programmed and conducted using z-Tree 3.6.7 (Fischbacher, 2007) and GIMS 7.5.2 (Palan, 2015). The experiment was conducted in English and was open to students from both Dutch and international programs.

All study procedures were approved by the ethics board of the School of Social and Behavioral Sciences at Tilburg University, EC-2018.EX187, and all procedures and

13 We aimed at eight sessions with two markets per session in our preregistration with 8-10 participants per market. Due to several no-shows, we had one session with a single market and in another session, we had one market that only included seven participants.

14 One of 128 participants did not complete both phases and was removed from the sample.

hypotheses were preregistered through AsPredicted. Data and study materials are available through the Open Science Framework (<https://osf.io/gqmk7/>).

Survey with Individual Measures (First Phase)

The full questionnaire can be found in the online supplementary materials (Appendix 4.2). Our key measure was the 7-item self-report DGS (Seuntjens, Zeelenberg, van de Ven et al. 2015) to measure individual differences in greediness. See Table 4.1 for all items and descriptive statistics of the DGS.

Table 4.1. Mean Scores, Standard Deviation and Factor Loadings (from a Factor Analysis) of the items of the Dispositional Greed Scale, $N=127$.

Items	<i>M</i>	<i>SD</i>	<i>Factor Loading</i>
1. I always want more.	3.70	0.78	.70
2. Actually, I'm kind of greedy.	3.06	0.97	.53
3. One can never have too much money.	2.96	1.17	.59
4. As soon as I have acquired something, I start to think about the next thing I want.	3.46	0.97	.60
5. It doesn't matter how much I have. I'm never completely satisfied.	2.71	1.07	.71
6. My life motto is 'more is better'.	2.62	1.06	.67
7. I can't imagine having too many things.	2.39	1.01	.50
Mean dispositional greed	2.98	0.62	
Eigenvalue			2.69
% Variance Explained			38.42%
Cronbach's α	.73		
McDonald's ω	.81		

Note: Subjects indicated whether the items were descriptive of them. Responses were measured on a 5-point Likert scales ranging from 1, *completely disagree*, to 5, *completely agree*. Factor loadings are extracted from a Principal Component Analysis using a single component.

To measure loss aversion and risk aversion (interpreted as curvature of utility function) participants completed two sets of 11 lottery choices taken from Bradbury et al. (2015). The lotteries were presented in a price list style, similar to Holt and Laury (2002), but with simple numbers. Participants chose between a risky investment (two outcomes with equal probability) and a risk-free investment (a single outcome with certainty). The lottery tasks were incentivized. In particular, one lottery row was selected for payment for 20% of the participants. For a measure of self-assessed investment risk preferences, participants additionally rated their willingness to take financial risks on 1 = *very low willingness* to 5 = *very high willingness* (Nosić & Weber, 2010). We included both measures of risk aversion (i.e., self-reported and lottery-incentivized risk preferences) separately, as they did not correlate very strongly [$r(127) = .37$ and $p < .001$].

Other control measures that can influence investment behavior included risk perception, illusion of control¹⁵ (both items selected from Nasic & Weber 2010), self-reported financial literacy and their belief about others' financial literacy (5-point-scales), financial experience, age and gender.

Trading in Experimental Asset Market (Second Phase)

The second phase was the experimental asset market which closely mimics the design of Smith et al. (2014), Holt et al. (2017) and particularly the INC condition of Weitzel et al. (2020). In each market, a group of 7-10 participants traded assets of a fictitious company for experimental currency (called "Taler"). We implemented a typical continuous double market auction mechanism with limit and market orders, being standard in the literature, in which participants could buy and/or sell assets in a sequence of 20 periods that lasted for 2 minutes. Participants first answered three control questions to ensure sufficient understanding. Only after all participants answered these correctly, two full trial periods followed in which participants could practice trading and the use of the software without any monetary consequences. Participants also indicated how well they understood the instructions on a scale from 1 = *not at all understood* to 5 = *completely understood* ($M = 3.68$, $SD = 0.73$). Participants were clearly informed that trial periods did not influence earnings.

Next, participants continued with the actual incentivized trading. In each market, participants were initially endowed with 560 Taler and 20 assets, leading to a 50-50 split between asset value and cash for each participant given a risk-neutral FV of 28 Taler per asset. Every market comprised 20 consecutive trading periods. Both Taler and asset holdings were carried over each period to the next. At the end of each period, an interest of 5% was paid on Taler holdings and added to their Taler accounts. Furthermore, in each period (except in the final period) each asset in possession paid dividend of either 1.20 or 1.60 Taler with equal probability, which was the same for all assets in that period. The redemption value for each asset in possession at the end of the final period was 28 Taler. Participants received an income (capital inflow) of 100 Taler at the beginning of each new period. Borrowing money or shorting assets were not allowed. All this information was public knowledge. These market characteristics resulted in a risk-neutral and constant FV of 28 Taler in all periods and an increasing CA-Ratio over time (for details see Weitzel et al., 2020). Table 4.2 provides an overview of the market parameterization. The market instructions can be found in the online supplementary materials (Appendix 4.3).

Traders could post both limit and market orders. Limit orders specify both the price and quantity of assets traders want to trade for. Market orders only specify the quantity that traders want to trade (as a reaction to a limit order posted by

15 Items include participants' self-estimated ability to identify winning stocks and the correctness of their stock forecasts

another trader). Cancellation of posted limit orders was possible any time before trade execution.

Heterogeneous price beliefs can drive overvaluation and bubbles (e.g., Morris, 1996). Following the design of Holt et al. (2017) and Weitzel et al. (2020), we thus also, for exploratory purposes, elicited participants' beliefs about future average period prices (up to three periods ahead) before the start of each period. Participants received an additional 50 Taler per prediction if a prediction was within a range of $\pm 5\%$ of the average market price in the corresponding period. Participants received feedback on their forecast accuracy only after the final period and additional Taler earnings from forecasts were not added to their accounts until the end of the experiment.

After the conclusion of the market experiment, the final amount in Taler was exchanged to euro at an exchange rate of 400:1. We also administered a short post-experimental questionnaire including a measure for post-understanding of the market, how greedy they felt during the experiment (state greed) and outcome satisfaction.

Table 4.2. Overview of Market Parameterization (Weitzel et al., 2020).

Parameterization	All markets
Number of periods	20, 120 sec per period
Number of traders per market	7-10
Buyback price	28 Taler
Interest rate per period	5% of Taler holdings before dividend payment
Dividends per asset per period	1.20 or 1.60 Taler (50%; 50%)
Initial endowment per subject	20 shares / 560 Taler
Additional cash per period per subject	100 Taler
CA-ratio (period 1/10/20)	1/4/10
Exchange rate	1 euro for 400 Taler
Mechanism	Continuous double auction

Note: Assets pay dividends and interest is paid on Taler holdings before dividend payment. Assets are bought back after the final period. CA-ratio stands for the cash to asset-value ratio in the respective periods 1/10/20 (i.e., total cash divided by the product of the number of assets outstanding and the fundamental value of 28).

Results

We investigate how individual differences in greed relate to individual trading, ordering and pricing behavior and contribute to the occurrence of asset market bubbles. We first conduct preliminary market-level analysis to get an idea of market dynamics that individual traders operate in and correlations between relevant (control) variables (Preliminary Analyses), before evaluating our main (Main Analysis: Individual Investment Behavior) and exploratory (Additional Analysis) hypotheses using multilevel regression analyses.

Preliminary Analyses

In the average market, 5580.87 ($SD = 4622.61$) assets were ordered of which 1017.13 ($SD = 500.90$) assets were transacted in 367.07 ($SD = 147.62$) trades. Similar to Weitzel et al. (2020), the average transaction price was 38.45 ($SD = 11.52$) Taler per asset, implying an average overpricing of approx. 10 Taler, or 37%, compared to the risk-neutral FV. The average greed score in a given market does not correlate with the average price paid per asset in that market [$r(15) = .11, p = .698$], nor does it correlate with the average volume traded in that market [$r(15) = -.28, p = .313$].

For a first visual assessment of market dynamics, Appendix 4.4 in the online supplementary materials shows the time series of average transaction prices in Taler and the DGS scores for each market. Bubble-like patterns occur in about half of the markets, comparable to related literature using these market settings (Holt et al., 2017; Weitzel et al., 2020). Price dynamics differ per market, which justifies the use of multilevel analysis to account for these differences.

Following Stöckl et al. (2010), we compute the relative deviation of prices to the fundamental value (RD) and the relative absolute deviation of prices to the fundamental value (RAD), normalized at the FV of 28, for each market as measures of, respectively, overpricing and mispricing. Furthermore, we compute overpricing at the peak (RDMAX) taken from Razen et al. (2017) and the magnitude of overall price changes relative to the FV (Amplitude) taken from Haruvy and Noussair (2006). These measures and market descriptive statistics can be found in Appendix 4.5 of the online supplementary materials. Median RD equals 26.8%, median RAD equals 27.3%, median RDMAX equals 50.2% and median Amplitude equals 59.5%, slightly lower than—but of comparable magnitude—to the student participants in the INC condition in Weitzel et al. (2020).

As desired, the average greed level did not differ between the different markets, $F(14, 112) = 1.07, p = .396$. Similarly, there are no significant effects for any of the control variables and thus, no post hoc tests (Tukey's HSD) needed. Individual traders, hence, operated in similar markets in terms of trader characteristics.

Table 4.3 provides an overview of means and standard deviations of all variables, and their correlation with our greed variable. Dispositional greed as measured pre-trading is significantly correlated with how greedy participants reported to feel

after trading ended (state greed), $r(127) = .19$ and $p = .035$, which indicates that the motive of greed is related to the feeling of greed after trading. Dispositional greed was also significantly correlated with self-reported post market understanding of the game, $r(127) = .18$ and $p = .038$, but no other variables. Greed scores are uncorrelated with risk preferences. Appendix 4.6 of the online supplementary materials provides a correlation matrix of control variables. Overall, we conclude that markets are different in their price dynamics comparable to previous literature. Furthermore, our control variables show low or no correlation with our greed measure.

Main Analysis: Individual Investment Behavior

Our main hypothesis is that traders scoring higher on greed show higher levels of trading activity. Market activity includes both trading and ordering behavior. We use a multilevel analysis with periods nested in participants, nested in markets to account for both hierarchical data (participants trading in markets) and repeated measures (participants trading for 20 periods). We first regress the total number of assets traded and the total number of assets ordered on standardized dispositional greed (top Table 4.4), after which we include all standardized control variables (loss aversion lottery, risk aversion lottery, risk preference, risk perception, illusion of control, financial literacy, financial literacy of others, experience, age and gender) in a second regression (middle Table 4.4). We find no effect of greed on the total amount of assets traded nor on the total amount of assets ordered. Thus, we do not find an effect of greed on trading activity on the individual level.

Out of the ten control measures, illusion of control (i.e., their self-estimated ability to identify winning stocks and the correctness of their stock forecasts, Nasic & Weber, 2010) positively predicts ordering behavior. Contrary to Breaban and Noussair (2015)'s "BearMarket", loss aversion does not predict a lower transaction volume in our study.¹⁶

In the next analyses (see Table 4.5), we zoom in on individual buying and selling behavior separately. We do not find an effect of greed on the number of assets bought or sold, also not on the number of assets in buying or selling orders. Out of the ten control variables, illusion of control positively predicts the number of assets in buying orders, but not the number of assets in selling orders. Vice versa, experience predicts more assets in selling orders, but does not have an effect on buying orders.

¹⁶ We reran our regressions for "total assets traded" and "total assets ordered" with single explanatory variables (both in- and excluding greed) to identify if basic relations can be found. We found that financial literacy positively predicts total assets traded. Self-reported risk tolerance, financial literacy, illusion of control and experience positively predict total assets ordered. Risk perception and gender negatively predict total assets ordered (meaning that males order more assets). Greed is not a significant predictor in any of the regressions. Hence, even when limiting the control variables to a minimum, we do not find an effect of greed on individual trading behavior.

Table 4.3. Correlations between Dispositional Greed and Other Individual Measures, Means and Standard Deviations.

Variable	Scale	<i>M</i>	<i>SD</i>	<i>r</i> (127)	<i>p</i>
Loss aversion lottery	1 (low) – 2 (high)	1.42	0.23	-.16	.080
Risk aversion lottery	1 (low) – 2 (high)	1.54	0.12	-.09	.337
Risk perception	0 (no risk) – 10 (high risk)	4.66	1.98	-.10	.287
Willingness to take risk	1 (low) – 5 (high)	2.29	0.88	.15	.092
Financial literacy	1 (bad) – 5 (good)	2.96	0.94	.16	.075
Financial literacy of others	1 (bad) – 5 (good)	3.36	0.66	-.02	.787
Illusion of control	1 (low) – 5 (high)	2.60	0.65	.04	.680
Financial experience	1 (none) – 5 (a great deal)	2.17	0.87	.12	.170
Age	Continuous	21.41	2.93	-.10	.280
Gender	0 = male, 1 = female	0.43	0.50	-.13	.134
Pre market understanding	1 (low) – 5 (high)	3.68	0.73	.00	.988
Post market understanding	1 (low) – 5 (high)	3.49	0.90	.18	.038
State greed	1 (low) – 5 (high)	3.52	0.94	.19	.035
Outcome satisfaction	1 (low) – 5 (high)	3.55	1.03	.01	.921
Market profit	Continuous	15.44	3.76	.10	.257
Bonus payment	Continuous	3.22	1.49	-.05	.540

Table 4.4. Summary of Multilevel Models (Uncontrolled, Top and Controlled, Middle) with Random Intercepts (*N* = 127, 15 markets) for Total Assets Traded and Ordered.

	Total assets traded		Total assets ordered	
	<i>B</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Intercept	12.01**	1.43	32.90***	6.64
Dispositional Greed	-0.01 (p = .992)	0.71	3.90 (p = .545)	6.42
Intercept	12.03***	1.35	32.91***	6.51
Dispositional Greed	-0.37 (p = .606)	0.72	-1.17 (p = .845)	5.99
Loss Aversion (Lottery 1)	0.44	0.82	-2.07	6.83
Risk Aversion (Lottery 2)	0.46	0.81	1.64	6.79
Risk Perception	-0.38	0.72	-8.61	6.15
Risk Preference	0.43	0.85	9.26	7.13
Financial Literacy	0.98	0.90	1.64	7.60
Financial Literacy Others	-0.39	0.75	-2.75	6.17
Illusion of Control	0.68	0.81	15.09*	6.73
Experience	0.43	0.81	12.30	6.88
Age	-0.69	0.70	-1.79	5.92
Gender	-0.26	0.80	-4.65	6.78
Random effects				
Variance of subject intercept (level-2)	48.12 (6.94)		3476.90 (58.97)	
Variance of market intercept (level-3)	20.93 (4.58)		147.80 (12.16)	
Residual Variance	135.45 (11.64)		12846.60 (113.34)	
<i>R</i> ² _{marginal}	.02		.06	
<i>R</i> ² _{conditional}	.35		.27	

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; standard deviations in parentheses for random effects; R^2_{marginal} = variance explained by fixed factors, $R^2_{\text{conditional}}$ = variance explained by both fixed and random factors (Nakagawa & Schielzeth, 2013).

Table 4.5. Summary of Multilevel Models (Uncontrolled, Top and Controlled, Middle) with Random Intercepts (N = 127, 15 markets) for Buying and Selling Trades and Orders.

	Assets bought			Assets sold			Assets in buying orders			Assets in selling orders		
	B	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Intercept	6.00***	0.72	6.00***	0.72	23.20**	6.34	9.67***	6.34	9.67***	1.01		
Dispositional Greed	-0.05 (p = .894)	0.39	0.04 (p = .906)	0.34	2.54 (p = .676)	6.05	1.47 (p = .150)	6.05	1.47 (p = .150)	1.01		
Intercept	6.02***	0.68	6.01***	0.67	23.21**	6.25	9.70***	6.25	9.70***	1.06		
Dispositional Greed	-0.30 (p = .452)	0.39	-0.08 (p = .817)	0.34	-1.65 (p = .774)	5.73	0.48 (p = .611)	5.73	0.48 (p = .611)	0.95		
Loss Aversion (lottery 1)	-0.05	0.45	0.50	0.39	-0.75	6.55	-1.35	6.55	-1.35	1.08		
Risk Aversion (lottery 2)	0.39	0.44	0.07	0.38	1.73	6.51	-0.10	6.51	-0.10	1.07		
Risk Perception	-0.23	0.40	-0.16	0.34	-8.03	5.89	-0.54	5.89	-0.54	0.97		
Risk Preference	0.16	0.46	0.28	0.40	9.67	6.83	-0.42	6.83	-0.42	1.13		
Financial Literacy	0.58	0.49	0.40	0.43	1.24	7.28	0.42	7.28	0.42	1.20		
Financial Literacy Others	-0.32	0.41	-0.07	0.36	-1.35	5.91	-1.41	5.91	-1.41	0.98		
Illusion of Control	0.33	0.44	0.37	0.39	13.57*	6.44	1.51	6.44	1.51	1.07		
Experience	0.39	0.44	0.04	0.39	9.63	6.59	2.69*	6.59	2.69*	1.09		
Age	-0.34	0.38	-0.35	0.33	-1.04	5.67	-0.75	5.67	-0.75	0.94		
Gender	-0.09	0.44	-0.16	0.38	-3.10	6.50	-1.58	6.50	-1.58	1.07		
Random effects												
Variance of subject intercept (level-2)	13.48 (3.67)		9.44 (3.07)		3142.00 (56.05)		77.05 (8.78)					
Variance of market intercept (level-3)	5.06 (2.25)		5.23 (2.29)		138.80 (11.78)		4.85 (2.20)					
Residual Variance	58.44 (7.64)		59.49 (7.71)		12734.80 (112.80)		511.47 (22.62)					
R^2_{marginal}	.02		.02		.05		.04					
$R^2_{\text{conditional}}$.25		.21		.24		.17					

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; standard deviations in parentheses for random effects; R^2_{marginal} = variance explained by fixed factors, $R^2_{\text{conditional}}$ = variance explained by both fixed and random factors (Nakagawa & Schielzeth, 2013)

Additional analysis

Using three-level multilevel analyses with periods nested in participants nested in markets, we explore whether greedier individuals operate at different price levels. We first regress selling prices on standardized dispositional greed (top Table 4.6), after which we include all standardized control variables (middle Table 4.6). Our findings suggest that greedier individuals are more likely to sell their assets at higher prices. Zooming in, this result is driven by market orders, rather than limit orders, meaning that greedy individuals were quick in identifying and accepting higher priced selling opportunities (i.e., buying orders submitted by other traders). This result, however, is not robust to Bonferroni-Holm corrections for multiple comparisons. Hence, we find only very limited support for the idea that greedier traders are more active in a heated market environment characterized by higher price levels as potentially their greedy behavior will only be present in a particular environment. Out of the ten control variables, gender positively predicts the selling price, meaning that females sell their assets at higher prices. We find no effect of greed on the average price paid to buy an asset (online supplementary materials, Appendix 4.7). This suggests that greedier individuals do not start trading once markets are heated and price levels are higher.

To explore whether greedier individuals are more profitable, we use two-level multilevel analyses with participants nested in markets. Total profit consists of profit from trading performance (henceforth, trading profit) as well as profit from the precision of participants' price forecasts (henceforth, bonus profit). We find neither an effect of greed on total profit, nor on trading or bonus profits separately. When adding the ten standardized control variables in a second regression, we find that risk perception positively predicts total and trading profit and risk preferences negatively predicts bonus profit. Gender negatively predicts total and trading profit (i.e. males are more profitable in trading). These results can be found in Appendix 4.8 of the online supplementary materials. Overall, we conclude that the level of dispositional greed hardly affects individual trading behavior (measured in different ways).

To see whether differences in trading behavior emerge, but are simply washed out due to the highly interactive nature of double auctions over periods, we explore trading behavior in only the first period of the market. Using two-level multilevel analyses with participants nested in markets, we find no effect of dispositional greed on total assets traded, total assets ordered, and average price at which assets are bought. Similar to the analysis over all periods, we find that greedier individuals are more likely to sell their assets at higher prices in the first period, but this result is not robust to controlling for the ten control variables. These results of these analyses can be found in Appendix 4.9 of the online supplementary materials.

Further exploratory analyses looked at bid-ask-spreads (i.e., the difference between the highest price that a buyer is willing to pay for an asset and the lowest price that a seller is willing to accept), the disposition effect (i.e., the time between

buying and selling an asset) and the timing of the first sale for individual traders. Mann-Whitney tests indicated no difference in bid-ask-spread, disposition effect or timing of the first sale for individuals scoring high on greed and individuals scoring low on greed. Investigating the first periods (i.e., periods 1-10) and the last periods (i.e., periods 11-20) separately also showed no significant differences. The results of these analyses can be found in Appendix 4.10 of the online supplementary materials.

Discussion

This chapter reports on experimental asset markets in which we test for the effects of greed on individual trading behavior in experimental asset markets where individuals trade with each other in a competitive setting. We hypothesized that the desire to acquire more (either more assets or more capital) would drive higher levels of individuals' market activity. This is motivated by earlier findings that greed correlated with more productivity orientation, less self-control, more (buying) impulsivity and spending more money on financial products (Krekels & Pandelaere, 2015; Li et al., 2019; Mussel & Hewig, 2016; Seuntjens, Zeelenberg, van de Ven, et al., 2015). The results of our 15 experimental markets, however, do not show empirical support for this hypothesis, meaning that greedier investors do not order or trade more assets. In our exploratory analysis, we find weak evidence that greedier traders sell their assets at higher prices than their non-greedy counterparts by quickly identifying higher priced selling opportunities, but no effect on profitability. An analysis of only the first period does not suggest that effects were there but are washed out over time. Overall, we cannot conclude that those scoring high on dispositional greed trade fundamentally different.

This result might be surprising, since many sources suggest that there is a relationship between greed and asset market behavior and overpricing in stock markets, and many academic publications treat this relationship as given. Questionable practices by greedy bankers and investors have often been mentioned in popular and scientific press as one of the root causes of the 2008 global financial crisis that led to, among other things, increased unemployment and defaults (e.g., Gilliland & Anderson, 2014). As a result, the public was outraged by corporate greed (Dayno, 2018), motivating political action and public protest. To the best of our knowledge, the present study is the first empirical test of a relationship between the motive of greed and individual market behavior, taking advantage of most recent methodological developments in the study of experimental assets markets and greed. Importantly, our main variable, the DGS, measures the motive of greed independently of the behavior it is supposed to explain.

Table 4.6. Summary of Multilevel Models (Uncontrolled, Top and Controlled, Middle) with Random Intercepts (N = 127, 15 markets) for Average Price Sold.

	Average price sold (all transactions)		Average price accepted sales (market orders)		Average price accepted sell orders (limit orders accepted by others)	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Intercept	25.25***	2.12	12.88***	0.88	17.61***	2.16
Dispositional Greed	1.63* (p = .042)	0.80	1.51 (p = .079)	0.85	0.69 (p = .440)	0.90
Intercept	25.22***	2.06	12.85***	0.97	17.61***	2.01
Dispositional Greed	1.68* (p = .036)	0.79	1.97* (p = .021)	0.84	0.24 (p = .782)	0.87
Loss Aversion (lottery 1)	0.16	0.90	1.05	0.96	-0.47	0.98
Risk Aversion (lottery 2)	-0.21	0.89	-0.88	0.95	-0.37	0.97
Risk Perception	1.27	0.93	0.48	0.86	-0.49	0.87
Risk Preference	0.24	0.79	0.07	1.00	1.66	1.02
Financial Literacy	0.39	0.99	0.90	1.07	0.00	1.09
Financial Literacy Others	-0.14	0.83	0.03	0.87	0.40	0.91
Illusion of Control	0.68	0.89	-0.60	0.95	2.08*	0.98
Experience	-0.86	0.89	-2.01*	0.96	0.33	0.98
Age	-1.44	0.77	-0.14	0.83	-2.09*	0.84
Gender	2.24*	0.88	1.48	0.85	2.24*	0.96
Random effects						
Variance of subject intercept (level-2)	45.16 (6.72)		64.46 (8.03)		60.09 (7.75)	
Variance of market intercept (level-3)	56.08 (7.49)		4.49 (2.12)		51.05 (7.15)	
Residual Variance	400.12 (20.00)		316.58 (17.79)		369.81 (19.23)	
R^2 marginal	.02		.02		.03	
R^2 conditional	.22		.20		.25	

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; standard deviations in parentheses for random effects; R^2 marginal = variance explained by fixed factors, R^2 conditional = variance explained by both fixed and random factors (Nakagawa & Schielzeth, 2013).

We mimicked the experimental asset market design of Weitzel et al. (2020) to employ a number of features that are comparatively close to features in real-world financial markets, such as dividend and interest payments, and capital inflows as bubble-drivers with a constant fundamental asset value to guarantee participants' understanding, and to have clear benchmarks for trading such as a well-defined fundamental value. Our market-level results shows bubble-like patterns that are comparable to related literature using these market settings (Holt et al., 2017; Weitzel et al., 2020). Our study also includes a host of control variables, including risk preferences and loss aversion.

As explained in the Method section, our choice for economic and management students as participants was motivated by an initial study that we ran with psychology students. This initial study turned out to be problematic, as the psychology students had a hard time understanding the experimental asset markets and the markets indeed showed quite some unexpected trading behavior (see the online supplementary materials for a full description of this initial study). Therefore, we decided to rerun the study with more numerically eloquent participants that are familiar with thinking in terms of markets and trading. Exposure to economics education has been associated with a more favorable attitude towards greed and has also been associated with greedy behavior (L. Wang et al., 2011), so not surprisingly the average dispositional greed scores of the economics and management students was significantly higher than that of the psychology students. These economics and management students are also more likely to become financial professionals later in life, whose greed scores are higher on average (Krekels & Pandelaere, 2015; Van Muijen & Melse, 2015). Notably, the results of this initial study were qualitatively similar to the results of the current study, namely that we found no effect of dispositional greed on trading behavior.

Like most experimental literature, we investigated the behavior of student participants, and not the behavior of "the main protagonists in financial markets: financial professionals" (Weitzel et al., 2020, p. 2,660), which might limit the external validity of this research line. To close this gap, Weitzel et al., from whom we borrow the experimental trading design, compared the behavior of financial professionals to the behavior of students in experimental asset markets. They found that students as well as professionals are susceptible to bubbles (i.e., affected by bubble-drivers in their study), even in controlled market environments with a single tradable asset. Markets populated by professional traders, however, were more efficient than student markets. Hence, they conclude that "even though the treatment effect sizes are smaller for professionals and bubbles are less likely [than for student participants], qualitatively, the effects are comparable in direction and statistical significance" (Weitzel et al., 2020, p. 2,691). The research by Weitzel et al. thus provides insights into how the behavior of student participants in these market designs compares to the behavior of financial professionals. Markets with professionals are generally more stable and efficient than markets with student participants. The findings of Weitzel et al. indicate that our research findings might be generalized to the professional bankers and investors, as in that perhaps

for them greed also did not drive their behavior. Other literature indicated that professionals differ in terms of their competitiveness in rankings (Kirchler et al., 2018). Hence, of course, our study is only one step in having more clarity about the extent to which greed may have contributed to the 2008 financial crisis.

We found no effect of dispositional greed on trading behavior, but this might not necessarily mean that the greedy disposition has no effect what so ever, as greedy trading behavior might be driven by an interplay between situation and personality, that was not present in our experimental asset markets. An important moderator might be at play that triggers the translation of personality in behavior. We can identify several differences between our study and real-life trading. One important difference that might have tempered greedy behavior is the difference in incentive structure. Banking risk is generally shared, whilst gains, such as performance bonuses, are personal. In our design, participants deal with personal gains and personal risks, as participants invest their own money and their payments are based solely on their own trading decisions. It would be interesting to see if people are more likely to act out their greedy inclinations if they trade and take risks with other people's money. A second difference is the lack of competition in our design. Participants trade for themselves and only get an indication of their own performance throughout the task. In reality, bankers also see the bonuses received by other bankers and might react to that by engaging in more greedy behavior. A future study could inform participants about the performance of other traders. A third difference is that our experimental asset market might not capture the temptations of electronic trading platforms with the simultaneous trading of multiple stocks and especially Wall Street trading pits. The lack of this dynamic in our design might create a less hot decision environment (Metcalfe & Mischel, 1999). As a result, participants might be less responsive to the environmental factors, leading to less emotion-driven and impulsive decisions, and thus tempering greed. A fourth difference is that greedy (investment) bankers are likely to be surrounded by other greedy bankers. Greed has found to be high for those working in banking and the financial sector (Krekels & Pandelaere, 2015; Van Muijen & Melse, 2015), perhaps creating a culture of greed (see also, Cohn et al., 2014). Seeing others acting out their greedy inclinations might reinforce (and justify) one's own greedy behavior. Future research should test this hypothesis by sorting individuals into greedy and non-greedy markets and evaluating its effect on market efficiency.

One potential other reason why previous research found some indirect evidence for an effect of greed on trading behavior, but why we do not find an effect in the current study, might be that the market situation is such that all people will act greedily. The dynamic market environment might trigger greedy behavior at all levels, also for those scoring low on the dispositional greed scale. The previous research that found effects of greed on various economic behaviors typically made use of static one-shot games (e.g., Seuntjens, Zeelenberg, van de Ven et al., 2015). Another reason might be that greedy individuals experience contradicting desires throughout the task: They might be in limbo between acquiring more money and acquiring more assets, and the task may be too short for this internal conflict to be

resolved. In the previous studies demonstrating the effects of greed, the outcomes were more unidimensional and hence it was more obvious what the desire should focus on. A final reason might be that the market mechanism is so complex and attention demanding that it overrides and suppresses one's predispositions. Future research could test the effect of simpler market machinery, for example with one sided auctions as in Budescu and Maciejovsky (2005).

To summarize, this chapter presents the result of 15 experimental asset markets in which we test the effects of greed on trading behavior. We did not find empirical support for the idea that greedier investors trade fundamentally different from their less greedy counterparts in markets. These findings shed light on the role of greed in the emergence of asset market bubbles in specific and of the financial crisis in general, and provide directions for future research.

Chapter 5

A Culture of Greed: Bubble Formation in Experimental Asset Markets with Greedy and Non-Greedy Traders

This chapter is based on Hoyer, K., Zeisberger, S., Breugelmans, S. M., & Zeelenberg, M. (2021). A culture of greed: Bubble formation in experimental asset markets with greedy and non-greedy traders. *Manuscript under review*

We investigate the relation between the motive of greed and several asset market indicators such as trading activity and bubble formation in the form of mispricing, overpricing, and price amplitude. To that end, we run experiments in which we are able to measure individuals' greed and create markets populated with greedy and markets with non-greedy investors. High-greed markets exhibited less frequent and smaller price bubbles than markets with less greedy traders. As for trading activity, we find only small evidence of greedier individuals showing higher trading activity. If our findings translate to actual markets, our findings suggest that, contrary to common suggestions, greed might not contribute negatively to the emergence of financial crises.

- Preregistration: https://aspredicted.org/WHI_AKN
- Materials, data, and analyses scripts: <https://osf.io/3ncyf/>.
- Appendix: <https://osf.io/8trus/>

Financial markets are important as facilitators of an efficient flow of capital. As such they play a vital role for the functioning of an economy. Understanding financial behavior in such markets is, therefore, of similar importance, because it can help us to detect where, when, and how those markets clear or fail. The most recent and perhaps one of the biggest failures of such markets was the global financial crisis that started in 2008. Our current research was inspired by this crisis, and by one of its most frequently mentioned causes: The apparent greed of the financial decision makers.

Following the 2008 financial crisis, news headlines were full of stories of individual and corporate greed (Mason, 2009; Mazumder & Ahmad, 2010). Whilst the economy sank into recession, greedy bankers and traders became depicted as the culprits of financial decline, which led to—among other things—increased unemployment and business and country defaults. Many people lost their sympathy for the stock market which they associated with greed, scandals and speculation (Wagner, 2020); there was public outrage and the Occupy movement at the end of 2011, targeting the industries and companies that were seen as responsible for the financial collapse (Dayno, 2018; Gilliland & Anderson, 2014). The message conveyed was clear: greedy investment and commercial bankers took too many unnecessary risks and behaved recklessly with their clients' money in order to ensure greater turnover and personal gains (e.g., Brummer, 2015; Papatheodorou et al., 2010). This acquisitiveness, combined with the harm-to-others as a result of their behavior, likely made lay people perceive the bankers as extremely greedy (Helzer & Rosenzweig, 2020).

The scientific literature mostly treats the relationship between greed and stock market volatility as a given (cf. Hoyer et al., 2021). Papatheodorou et al. (2010, p. 42), for example, simply stated that “the current financial crisis is related to the greed of major banks” and Mazumder and Ahmad (2010, p. 113) named the “greed of Wall Street investment bankers who took excessive risk” as one of the causes. Some authors even nearly exclusively point to greed as the cause of the 2008 financial crisis (Kirchgässner, 2014). According to Kothari (2010, p. 35) “Executive greed may bring in another crisis, much sooner than later.” However, in spite of these claims, there is as of yet remarkably little empirical evidence to the effect that greed and financial crises are related.

Personality, emotions and moods have been shown to have a big influence on financial decision making (see, for example, Au et al., 2003; Oehler et al., 2019; Summers & Duxbury, 2012). Similarly, greed is an important economic motive related to a variety of economic behavior, and, hence, it seems intuitive to assume that greed contributes to the emergence of financial bubbles. Greed can be defined as “the desire to acquire more and the dissatisfaction of never having enough” (Seuntjens, Zeelenberg, Breugelmans, et al., 2015, p. 15). Individual differences in the motive of greed have been successfully measured by the Dispositional Greed Scale (DGS; Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Zeelenberg et al., 2021). Scores on the DGS predicted taking more money in dictator and ultimatum games

and contributing less in resource dilemmas. Greedy individuals tend to have higher spendthrift, less self-control and higher buying impulsivity and report being more willing to accept bribes and engage in unethical behavior (Li et al., 2021; Seuntjens et al., 2019). At the same time, greedy people tend to work harder and generate more income (Seuntjens et al., 2016; Zeelenberg et al., 2020). With regards to investing behavior, greedy individuals report investing more money in financial products in general and in stocks and savings accounts in particular (Mussel & Hewig, 2016). Although a link between a greedy disposition and individual risk-taking is often suggested, findings to this effect are contradictory. For example, Seuntjens, Zeelenberg, Van de Ven, et al. (2015), found no relationship between greed and risk aversion in the Holt and Laury (2002) lottery using a sample of 236 psychology students, whilst Mussel et al. (2014) did find greed to predict risk-taking in the balloon analogue risk task (BART; Lejuez et al., 2002) using a sample of 20 male economics students. Li et al. (2019) found that the DGS correlated significantly with risky choices in mixed gambles, but not in gambles about only gains or only losses. Li et al. also computed coefficients for loss aversion and risk attitude and found that greed was negatively correlated with loss aversion, but not with risk attitude.

It can be concluded that it seems plausible that greed influences financial decision-making and contributes to financial bubbles, but that empirical evidence to this effect is still lacking. In a recent study, Hoyer et al. (2021) presented a first systematic test of the effects of the motive of greed (measured by the DGS) on individual trading behavior in experimental asset markets. They found no evidence for the idea that greedier investors show higher levels of trading activity, i.e., buying, selling, and ordering of assets. Those scoring high on dispositional greed did not trade fundamentally different than their non-greedy counterparts. These findings suggest that the relationship between greed and the emergence of financial bubbles might not be as strong as was widely assumed. However, there was an important limitation in the study of Hoyer et al (2021) in the sense that their markets consisted of individuals with substantially different levels of dispositional greed. Heterogeneity in greed may have tempered the effects of greedy behavior in experimental asset markets. If the common intuition is correct that bankers are more greedy than the average person and if these greedy bankers are likely to be surrounded by other greedy bankers, this may lead to the creation of a 'culture of greed' wherein being greedy is the norm rather than the exception (cf. Cohn et al., 2014). In such contexts, the negative effects of greed on the emergence of bubbles may be much more salient.

There are a number of sources suggesting such so-called self-assortment effects in greed ("birds of a greedy feather flock together"). Hirschfeld and Van Scotter (2019) discuss anecdotal evidence on the relationship between dispositional greed and vocational choice. Burke (2009) presents a number of narratives about criminality and corruption suggesting that greedy individuals may indeed be attracted to careers in the financial sector. Furthermore, exposure to economics education has been associated with a more favorable attitude towards both

greed in general as well as one's own greed (Wang et al., 2011). In the same study, economics education has also been associated with greedy behavior in a dictator game. More direct empirical evidence for self-assortment of greedy people in financial jobs comes from a large-scale study among more than 120,000 employees in the Netherlands (Van Muijen & Melse, 2015). Dispositional greed was found to be high for people preferring extractive industries, real estate, banking and insurance, and low for people preferring education, healthcare and government sectors. Respondents with an above-average greed score mainly worked in sales, retail, IT, logistics and, indeed, finance. Krekels and Pandelaere (2015) also found that U.S. respondents working in financial and management sectors were greedier than those working in services or the arts. Together, these results suggest that, on the one hand, people scoring high on greed are more likely to land a financial job, and on the other hand, that their education (economics, business, finance) and the financial industry might trigger greedy dispositions. Seeing others acting out their greedy inclinations might reinforce and justify one's own greedy behavior. Furthermore, anecdotal evidence suggests a varying level of greed depending on the market situation. So, potentially, at least over longer time horizons, asset price levels might relate to the aggregate level of greed in a market.

While Hoyer et al. (2021) examined the effect of greed on asset market behavior at the individual level, the present study is the first to investigate greed at market level, including overall market outcomes such as orders, trades and prices. More specifically, we test the effect of the motive of greed on stock market bubbles by sorting participants into greedy and less greedy markets. We expect to see more trading activity and larger bubbles in markets populated by greedy traders, because their greedy inclinations might drive more impulsive trading and traders' greedy behaviors might reinforce each other.

Of course, this type of experimental lab research does not necessarily allow for strong claims about the causes of the financial crisis that happened some 15 years ago. First and foremost because we do not (yet) study the behavior of groups of bankers. Also, the specific set-up of the current study is different from actual banking in various ways. Instead, we chose to more generally examine how greed affects trading behavior on the market-level. We believe that this type of research (see also the next section for similar types of studies), does provide us with the opportunity to learn something fundamental about the economic behavior of individual traders. Before we describe in detail the experimental asset markets that we ran, and the procedure of testing and sorting individuals on the basis of their greed score, we first explain why we think that birds of a greedy feather flock together (like attracts like) and how this sorting may influence their behavior.

Sorting Effects in Markets

"People choose situations that fit their personalities, and situations choose people that fit their requirements" (Kendrick et al. 2006, p. 82). Thus, in everyday life people

are not randomly assigned to situations. They actively choose dispositionally relevant situations where they can engage in activities and behaviors that fit their personalities while at the same time these situations reinforce the behavioral expressions of their traits (Ickes et al., 1997). In addition, people often need certain characteristics to enter a particular situation, like a specific grade point average to enter a good school. For the job market this means that people choose jobs with requirements that are concordant with their own (Ickes et al., 1997). As mentioned earlier, greedy individuals are likely to end up in financial professions and, as a consequence, be surrounded by other greedy individuals (Krekels & Pandelaere, 2015; Van Muijen & Melse, 2015).

Previous experimental studies investigated the impact of sorting participants on the formation of bubbles in financial markets (e.g., Dufwenberg et al., 2005; Van Boening et al., 1993). The most studied type of sorting is according to experience, where fewer and smaller bubbles form in markets with more experienced traders. When sorting based on information received, Sutter et al. (2012) found that markets with asymmetrically informed traders have smaller bubbles than markets with symmetrically or uninformed traders. Sorting participants according to professional experience, Weitzel et al. (2020) found that markets populated by financial professionals are susceptible to bubbles, but more efficient in pricing, that is, smaller bubbles, than student-populated markets. Administering testosterone to participants generated larger and longer-lasting bubbles (Nadler et al., 2018). Eckel and Füllbrunn (2015) showed that gender composition can also influence the emergence of bubbles, with all-male markets being more susceptible to bubbles. However, Cueva and Rustichini (2015) found no significant difference between all-male and all-female markets. Holt et al. (2017) found larger bubbles for all-male markets when the fundamental value (FV) was declining, but no differences for a constant FV. While gender as sorting criterion can easily be observed by participants themselves, other relevant criteria are less clearly visible to participants. For example, Bosch-Rosa et al. (2018) found that no bubbles arise in markets composed of participants with high cognitive abilities. Larger bubbles arise in markets populated by traders who exhibited more speculative behavior (Janssen et al., 2019) and more risk-tolerant traders (Kiss et al., 2019). Hefti et al. (2018) found that sorting participants according to both analytical and mentalizing skills contributed to differences in individual trading success. Personality traits also affect bubble formation: Oehler et al. (2019) found that bubbles lasted longer in markets with a lower proportion of neurotic participants and in markets with higher proportion of extraverted participants. Cheung et al. (2014, p. 92) showed that, “in addition to its direct effect in reducing confusion, much of the effect of training subjects to understand FV also requires that it be made known to the market that confusion has indeed been reduced”, meaning that informing participants about the nature of the sorting can strengthen the effect of the sorting.

The effect of sorting participants on greed on bubble formation has not yet been investigated. However, in a simulation, Lussange et al. (2019) used multi-agent systems and reinforcement learning dynamics to model the stock market and

implement specific behavioral traits, such as greed. They defined a greed profile in terms of a learning strategy that postulated buying only if the price is expected to increase, ignoring other state indicators such as price volatility and stock liquidity based on previous exchange volumes. The conclusion of their simulations was somewhat counter-intuitive given previous claims about the contribution of greed to market bubbles and crises: larger populations of greedy agents increased rather than undermined market stability. More specifically, more greedy agents in the markets lead to a decrease in price volatility and a diminution of market crashes. Furthermore, trading volume increased, returns decreased and the rates of agent bankruptcy decreased with a larger percentage of greedy agents in the market. In Lussange et al.'s model, greed was defined in terms of a learning strategy. The question is whether such findings generalize to greed as an economic motive. The current study assesses the motive of greed independently of the behavior that it is supposed to explain.

Experimental Setup

We recruited 206 student participants from a Dutch University for 2h sessions in May/June and September 2019¹⁷ (including giving instructions to participants, running of the experiment, and paying of participants). Participants were predominantly enrolled in economics or management programs. The experiment was conducted in English and was open to students from both Dutch and international programs. Participants had not previously traded in similar markets.

The experimental setup is similar to the one described in Hoyer et al. (2021). Every session consisted of three phases: the survey, a filler task and the market phase.¹⁸ The average payout from sessions was €22.18 with some substantial variation ($SD = €7.99$). After sorting participants according to their scores on the Dispositional Greed Scale, we ran 10 "high greed" and 10 "low greed" experimental asset markets, with market sizes of 7-9 participants ($N = 162$, 50.6% female; $M_{age} = 22.10$, $SD = 4.88$). In cases where more than sufficient participants were present, a "middle greed" market was also constructed to increase the difference between the low and high greed markets. Data from these middle markets were not included in the analyses (3 markets, $N = 33$).

Participants were seated behind laptop computers with partition walls on three sides. In the first phase of the study, participants completed an online survey that included a consent form, several individual measures and demographics. In the second phase, participants participated in a filler task: an individual investment task programmed in oTree (D. L. Chen et al., 2016; Huber, 2019). The filler task allowed for time to compute greed scores and prepare the sorting. After all

17 There was no significant difference in the greed scores between the May/June sessions ($M = 2.65$, $SD = 0.62$) and the September sessions ($M = 2.63$, $SD = 0.55$); $t(193) = 0.16$, $p = .873$.

18 One session ended prematurely after the second phase due to a fire drill.

participants in the session completed the filler task, they were sorted into high greed and low greed markets (and middle greed markets where possible) before the third phase of the study started: The experimental market phase. Participants were not informed about the sorting nor about the type of market. In the last phase, participants participated in an experimental asset market and in a post-market survey, programmed and conducted using z-Tree 3.6.7 (Fischbacher, 2007) and GIMS 7.5.2 (Palan, 2015).

The study was approved by the ethics board of the School of Behavioral Sciences at Tilburg University, EC-2018.EX187, and all procedures¹⁹ and hypotheses were preregistered through AsPredicted (#23974, https://aspredicted.org/WHI_AKN). Data and study materials are available through the Open Science Framework (<https://osf.io/3ncyf/>).

Survey (Phase 1)

The full questionnaire can be found in Appendix 5.1. Our key measure was the 7-item Dispositional Greed Scale (DGS; Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Zeelenberg et al., 2021) to measure individual differences in greed (responses on a Likert-type scale ranging from 1 = completely disagree to 5 = completely agree). See Table 5.1 for items and descriptive statistics of the DGS.

Participants completed two sets of 11 lottery choices taken from Bradbury et al. (2015), to measure loss aversion and risk aversion. The lotteries were presented in a price list style, similar to Holt and Laury (2002). Participants chose between a risky investment (with two outcomes with equal probability) and a risk-free investment (a single outcome with certainty). Lottery tasks were partly incentivized: one lottery row was selected for payment for 20% of the participants. Participants also rated their willingness to take financial risks and risks in general on a scale, ranging from 1 = very low willingness to 5 = very high willingness (Nosić & Weber, 2010).

The questionnaire included several other measures that can influence market behavior: risk perception, illusion of control (both items from Nosić & Weber, 2010), self-reported financial literacy and their belief about others' financial literacy, financial experience, age and gender.

Experimental Asset Market (Phase 3)

Phase 2 was a filler task. Phase 3 was an experimental asset market with a double auction mechanism, similar to the INC condition of Weitzel et al. (2020), which was based on the design of Smith et al. (2014) and Holt et al. (2017). This design addresses potential confusion arguments as it does not have a decreasing fundamental value over time (Kirchler et al., 2012). In each market, 7–9 participants traded assets of a fictitious company for experimental currency (called "Taler").

¹⁹ We preregistered to run 16 markets (8 high greed; 8 low greed). Due to no shows, we only ran 10 markets (5 high greed; 5 low greed) in the first period of data collection. We decided to run an equal number of markets in the second period of data collection. Hence, we ran 20 markets (10 high greed; 10 low greed).

Traders could submit limit and market orders to buy and/or sell one or multiple assets. To guarantee understanding of the market, participants first received three control questions which they had to answer correctly before moving on. After that, they could practice trading in two trial periods. The two trial periods did not count towards their final earnings. They also indicated how well they understood the instructions (1 = not at all understood; 5 = completely understood). Pre- and post-market understanding were rated both as 3.5 on average (see also Table 5.5).

Table 5.1. Mean Scores, Standard Deviation and Factor Loadings (from a Factor Analysis) of the Items of the Dispositional Greed Scale, $N=162$.

Items	<i>M</i>	<i>SD</i>	<i>Factor Loading</i>
1. I always want more.	3.09	0.91	.74
2. Actually, I'm kind of greedy.	2.75	0.97	.73
3. One can never have too much money.	2.64	1.07	.63
4. As soon as I have acquired something, I start to think about the next thing I want.	3.07	0.98	.55
5. It doesn't matter how much I have. I'm never completely satisfied.	2.41	0.94	.65
6. My life motto is 'more is better'.	2.31	0.99	.70
7. I can't imagine having too many things.	2.26	0.98	.56
Mean dispositional greed	2.65	0.64	
Eigenvalue			3.00
% Variance Explained			43%
Cronbach's α	.77		
McDonald's ω	.82		

Note. Participants indicated whether the items were descriptive of them. Responses were measured on a 5-point Likert-type scales ranging from 1, *completely disagree*, to 5, *completely agree*. Factor loadings are extracted from a Principal Component Analysis using a single component.

Next, participants participated in the incentivized experimental asset market. Their initial, individual endowment was 560 Taler and 20 assets. Each trading phase lasted 120 seconds and there were 20 periods in each market. Taler and asset holdings at the end of each period were carried over into the next period. Taler holdings at the end of each period paid an interest of 5% which was immediately added to their Taler accounts. Each asset in possession also paid a dividend of either 1.20 or 1.60 Taler with equal probability in each period. Assets did not pay dividend in the final period. Instead, there was a redemption value of 28 Taler for each asset in possession by the end of the final period. There was a capital inflow (i.e., income) of 100 Taler per subject at the beginning of each new period. Neither shorting assets nor borrowing money was not allowed. All this information was included in the instructions that participants received before the start of the market (to be found in Appendix 5.2). Overall, this setup resulted in an increasing cash to asset-value ratio (CA-Ratio) over time from 1 in the first period to 10 in the last period and a FV that was held constant at 28 Taler (for details see: Weitzel et al., 2020). Table 5.2 provides an overview of the market parameterization.

It was possible for traders to post limit orders as well as market orders. For a limit order, the trader specified both the price and the quantity of assets they wanted to trade for. Canceling posted limit orders was possible as long as a trade was not yet executed.

Following the design of Holt et al. (2017), Weitzel et al. (2020), and Hoyer et al. (2021), and in order to keep participants engaged in the task, we also elicited participants' incentive compatible beliefs about future average period prices (up to three periods ahead) before the start of each period. Participants received an additional 50 Taler for each prediction within a range of $\pm 5\%$ of the observed average market price, which was added to their accounts at the end of the experiment. Feedback on their forecast accuracy was given after the final period concluded. The prediction data were only included for exploratory purposes and are not included in the main analyses.

Table 5.2. Overview of Market Parameterization (Weitzel et al., 2020)

Parameterization	All markets
Number of periods	20
Trading time	120 seconds per period
Number of traders per market	7–9
Buyback price	28 Taler
Interest rate per period	5% of Taler holdings before dividend payment
Dividends per asset per period	1.20 or 1.60 Taler (50%; 50%)
Initial endowment per subject	20 shares / 560 Taler
Additional cash per period per subject	100 Taler
CA-ratio (period 1/10/20)	1/4/10
Exchange rate	1 euro for 400 Taler
Mechanism	Continuous double auction

Note. Assets pay dividends and interest is paid on Taler holdings before dividend payment. Assets are bought back after the final period. CA-Ratio stands for the cash to asset-value ratio in the respective periods 1/10/20 (i.e., total cash divided by the product of the number of assets outstanding and the fundamental value of 28).

At the end of the market, the final amount in Taler was exchanged to euro at a conversion rate of 400:1. Finally, participants filled out a short post-experimental questionnaire including a measure for post-understanding, how greedy they felt during the experiment (state greed) and outcome satisfaction. Participants were paid individually after the experiment, either via bank transfer (about 60% of participants) or cash (about 40%), depending on their personal preference.

Results

Preliminary Analysis

We first looked at the orders placed and the trades made. The participants were quite active: On average, they submitted orders for 3289.15 ($SD = 2074.67$) assets of which 898.80 ($SD = 561.06$) were transacted in 425.20 ($SD = 155.47$) trades. The average trading price of 42.82 ($SD = 10.99$) Taler per asset was slightly higher than the ones reported by Weitzel et al. (2020) and Hoyer et al. (2021), indicating some level of overpricing. Market-specific (order) volumes, number of trades and average prices can be found in Table 5.3; the medians for the high greed and low greed markets can be found in Table 5.4.

As intended, the average greed level differed between the different markets, $F(19, 142) = 19.12, p < .001$. A post hoc test (Tukey's HSD) revealed that almost all markets classified as high greed markets differed significantly from all markets classified as low greed markets, indicating that the sorting process was effective. The highest low greed market (market 10, $M = 2.41; SD = 0.21$) and the lowest high greed market (market 19, $M = 3.04; SD = 0.40$), were different at $p = .057$. Ten out of eleven control variables (i.e., loss aversion lottery, general risk preference, financial risk preference, risk perception, illusion of control, financial literacy of oneself and others, experience, gender and age) did not differ between markets. The average risk aversion in the lottery task did differ between markets, $F(19, 142) = 1.70, p = .043$. Post hoc tests (Tukey's HSD), however, did not reveal any significant, pairwise market differences. Taken together, this points to markets being different in terms of average greed but similar in terms of all other trader characteristics.

Figure 5.1 displays the time series of average transaction prices in Taler and the DGS scores for each market. The upper panel shows low greed markets and the bottom panel high greed ones. Bubble-like patterns occurred in most of the low greed markets and some of the high greed markets.

Table 5.5 provides an overview of means and standard deviations of all variables, and their correlation with greed. Pre-trading measured dispositional greed was significantly correlated with willingness to take financial risks, $r(162) = .30$ and $p < .001$, and risks in general, $r(162) = .33$ and $p < .001$, but not with the other risk measures. Dispositional greed was also significantly correlated with financial literacy, $r(162) = .18$ and $p = .022$, age, $r(162) = -.19$ and $p = .015$, and prediction accuracy (i.e., bonus profit), $r(162) = .21$ and $p = .008$.

Main Analysis

Following our preregistration, we tested our hypotheses regarding trading activities and several efficiency measures in two ways. First, where possible, we used multilevel linear mixed effects models with periods nested in markets to account for repeated measures (20 periods per markets), with market greed as single predictor as well as including several control variables. Second, we computed the market means and tested for market differences by means of Mann-Whitney U-tests.

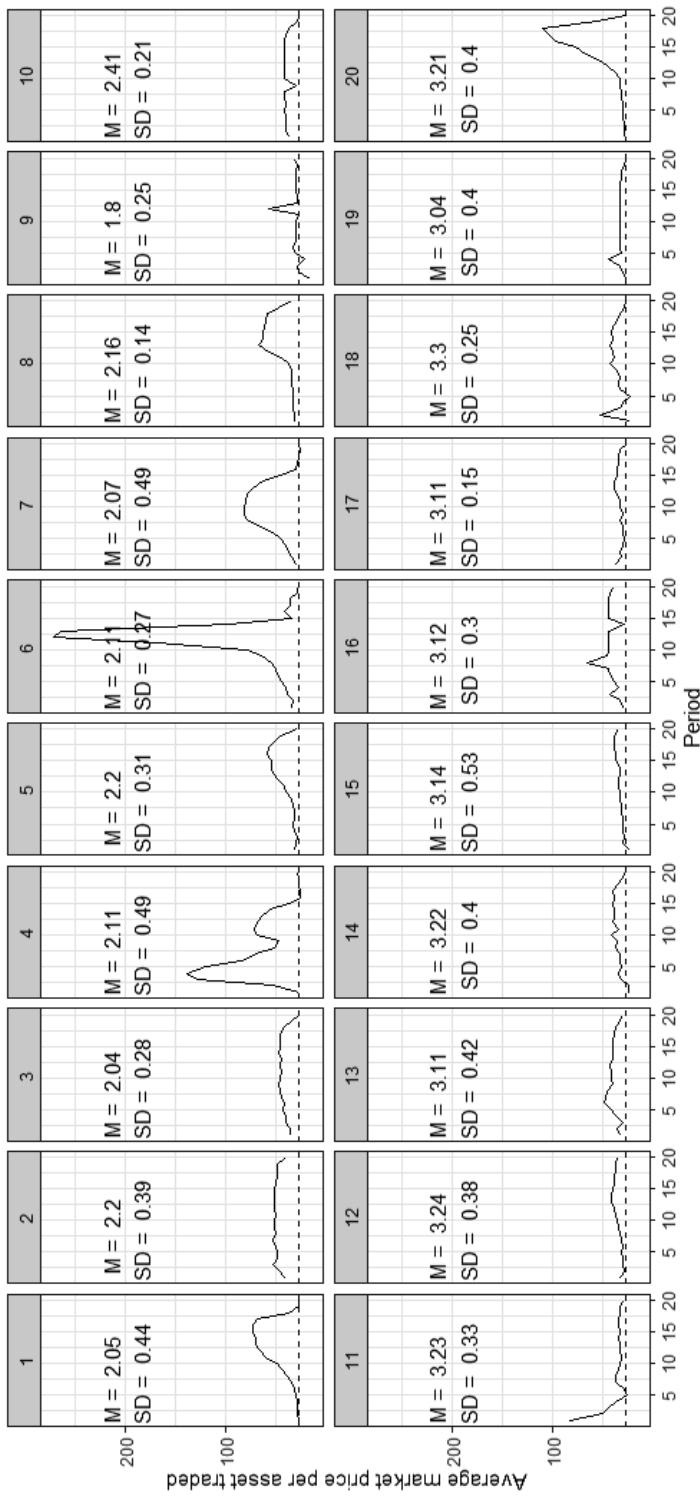


Figure 5.1. Time Series of Average Transaction Prices in Taler and Mean and Standard Deviation of the Dispositional Greed Score for Each Market. The Top 10 Markets are the Low Greed Markets, and the Bottom 10 are the High Greed Markets.
 Note: The dotted line indicates the constant fundamental value of 28 Taler.

Table 5.3. Descriptives and Efficiency Measures (RD, RDMAX, RAD and Amplitude) and for all Twenty Markets

Market	L/H	N	% Male	M _{greed} (SD)	RD	RDMAX	RAD	Amplitude	M _{Price} (SD)	Trade volume	Order volume
1	Lo	8	62.5%	2.05 (0.44)	0.65	1.64	0.65	1.67	46.24 (18.44)	625	3773
2	Lo	7	57.1%	2.20 (0.39)	0.78	0.90	0.78	0.47	49.73 (3.50)	587	1749
3	Lo	8	12.5%	2.04 (0.28)	0.52	0.73	0.52	0.73	42.60 (5.37)	1024	2199
4	Lo	9	44.4%	2.11 (0.49)	1.19	3.96	1.21	4.03	61.38 (34.70)	1134	3282
5	Lo	8	37.5%	2.20 (0.31)	0.48	1.10	0.48	1.07	41.36 (10.95)	616	2576
6	Lo	9	44.4%	2.11 (0.27)	1.68	8.69	1.68	8.65	75.06 (73.56)	594	3079
7	Lo	8	62.5%	2.07 (0.50)	0.86	1.94	0.86	2.00	52.01 (21.77)	460	1753
8	Lo	8	62.5%	2.16 (0.14)	0.61	1.43	0.61	1.30	45.13 (13.55)	519	1502
9	Lo	7	42.9%	1.80 (0.25)	0.09	1.06	0.15	1.49	30.39 (7.47)	684	2591
10	Lo	9	22.2%	2.41 (0.21)	0.40	0.51	0.40	0.51	39.18 (4.49)	564	1265
11	Hi	8	62.5%	3.23 (0.33)	0.33	1.95	0.33	2.00	37.15 (11.83)	192	6580
12	Hi	7	57.1%	3.24 (0.38)	0.26	0.49	0.26	0.44	35.32 (4.04)	248	1211
13	Hi	8	37.5%	3.11 (0.42)	0.41	0.76	0.41	0.68	39.53 (5.12)	588	2256
14	Hi	9	66.7%	3.22 (0.40)	0.24	0.48	0.27	0.61	34.77 (5.07)	911	3067
15	Hi	8	62.5%	3.14 (0.53)	0.18	0.38	0.20	0.48	33.17 (3.57)	1469	4040
16	Hi	8	75.0%	3.13 (0.30)	0.51	1.35	0.51	1.35	42.34 (7.70)	1457	3404
17	Hi	8	25.0%	3.11 (0.15)	0.19	0.39	0.19	0.46	33.24 (3.38)	1118	3964
18	Hi	8	62.5%	3.30 (0.25)	0.27	0.88	0.30	1.07	35.44 (7.29)	802	2554
19	Hi	8	25.0%	3.04 (0.40)	0.16	0.60	0.17	0.61	32.59 (3.46)	2117	4775
20	Hi	9	66.7%	3.21 (0.40)	0.76	2.95	0.76	2.95	49.26 (27.44)	2267	10163

Note: RD: relative deviation of prices to the fundamental value (Stöckl et al. 2010); RAD: relative absolute deviation of prices to the fundamental value, normalized at a FV of 28 (Stöckl et al. 2010); RDMAX: overpricing at the peak (Razen et al. 2017); Amplitude: magnitude of overall price changes relative to the FV (Haruvy & Noussair, 2006). Lo indicates a low greed market; Hi indicates a high greed market.

Table 5.4. Medians of Mispricing (RAD), Overpricing (RD), Maximum Overpricing (RDMAX), Price Amplitude (AMPLITUDE), Price, and Trade and Order Volume in Low and High Greed Markets

Variable median	Market sorting	
	Low greed	High greed
RAD (mispricing)	0.63	0.28
RD (overpricing)	0.63	0.26
RDMAX (max overpricing)	1.27	0.68
Amplitude (price amplitude)	1.40	0.65
Price	44.72	34.73
Trade volume	605.00	1014.50
Order volume	2387.50	3684.00
<i>N</i>	10	10

Table 5.5. Correlations between Dispositional Greed and Other Individual Measures, Means and Standard Deviations

Variable	Scale	<i>M</i>	<i>SD</i>	<i>r</i> (162)	<i>p</i>
Age	continuous	22.10	4.88	-.19	.015
Gender	0 = male, 1 = female	.51	.50	-.12	.134
State greed	1 (low) – 5 (high)	3.49	0.97	.10	.190
Risk aversion lottery	1 (low) – 2 (high)	1.44	0.13	.13	.105
Willingness to take risks	1 (low) – 5 (high)	3.09	0.83	.30	.001
Willingness to take financial risks	1 (low) – 5 (high)	2.51	0.87	.33	.001
Risk perception	0 (no risk) – 10 (high risk)	4.62	1.94	.00	.959
Loss aversion lottery	1 (low) – 2 (high)	1.46	0.23	-.08	.312
Financial experience	1 (none) – 5 (a great deal)	2.19	0.85	.14	.077
Financial literacy	1 (bad) – 5 (good)	2.75	0.95	.18	.022
Financial literacy of others	1 (bad) – 5 (good)	3.14	0.69	.01	.340
Illusion of control	1 (low) – 5 (high)	2.44	0.69	.15	.059
Pre market understanding	1 (low) – 5 (high)	3.49	0.80	-.01	.939
Post market understanding	1 (low) – 5 (high)	3.50	0.86	.12	.123
Outcome satisfaction	1 (low) – 5 (high)	3.49	1.10	-.08	.747
Market profit	continuous	15.47	5.29	.00	.977
Bonus payment	continuous	2.32	1.91	.21	.008

Trading Activity

To test the hypothesis that markets populated with greedy traders show higher levels of trading activity, we looked at trading and ordering volume. Using multilevel analyses, we first regressed the total number of assets traded and the total number of assets ordered on standardized market dispositional greed (displayed at the top of Table 5.6); then we performed the same regression, including all standardized market control variables (loss aversion lottery, risk aversion lottery, risk preference in general, financial risk preference, risk perception, illusion of control, financial literacy, financial literacy of others, experience, age and gender; displayed in the middle of Table 5.6). We found no effect of dispositional greed on either total

assets traded or total assets ordered. Loss aversion and risk perception positively predicted total assets ordered, and experience negatively predicted total assets ordered.

For trading volume, a Mann-Whitney U test indicated that there was no difference between low greed markets ($Mdn=605.00$) and high greed markets ($Mdn=1014.50$), $U=69.0$, $p=.166$. Similarly, for ordering volume, we found no difference between low greed markets ($Mdn=2387.50$) and high greed markets ($Mdn=3684.00$), $U=76.0$, $p=.052$. These findings did not confirm our hypothesis, although evidence seems to point in the direction that traders in greedy markets showed higher trading activity²⁰. At least for the number or assets that were planned to trade (ordered) we observed an almost significant difference with greedier individuals showing higher ordering activity.

Table 5.6. Summary of Multilevel Models (Uncontrolled, Top and Controlled, Middle) with Random Intercepts (20 Periods, 20 Markets) For Total Assets Traded and Ordered

	Total assets traded		Total assets ordered	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Intercept	44.94***	5.77	164.46***	20.58
Dispositional Greed	9.35 (p = .130)	5.91	42.98 (p = .055)	21.11
Intercept	44.94***	4.12	154.46***	14.43
Dispositional Greed	11.19 (p = .290)	10.29	-1.62 (p = .965)	36.04
Loss Aversion (Lottery 1)	0.85	5.77	42.85*	20.22
Risk Aversion (Lottery 2)	-6.49	8.83	27.07	30.93
Risk Perception	-2.61	5.63	41.56*	19.70
Risk Preference (general)	14.18	8.52	16.67	29.84
Risk Preference (financial)	-8.88	13.40	29.69	46.93
Financial Literacy	-5.13	9.47	36.66	33.17
Financial Literacy Others	0.82	6.35	3.93	22.23
Illusion of Control	6.62	8.50	-21.20	29.79
Experience	-9.41	6.51	-72.30**	22.79
Age	-3.20	6.39	-10.44	22.38
Gender	4.14	6.13	-41.85	21.46
Random effects				
Variance of market intercept (level-2)	318.00 (17.83)		2238.00 (47.31)	
Residual Variance	432.20 (20.79)		38545 (196.33)	
R^2_{marginal}	.35		.13	
$R^2_{\text{conditional}}$.63		.18	

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; standard deviations in parentheses for random effects; R^2_{marginal} = variance explained by fixed factors, $R^2_{\text{conditional}}$ = variance explained by both fixed and random factors (Nakagawa & Schielzeth, 2013).

²⁰ Similar results were obtained using a Welch two sample t-test.

Market Efficiency Measures

To test the hypothesis that greedy markets show larger bubbles, we look at asset prices and various bubble measures. Following Stöckl et al. (2010), we computed the relative deviation of prices to the fundamental value (RD, overvaluation) and the relative absolute deviation of prices to the fundamental value (RAD, mispricing), both normalized at the FV of 28, for each period and market. RD is a measure of overpricing; RAD is a measure of mispricing. Furthermore, we computed overpricing at the peak (RDMAX) taken from Razen et al. (2017) and the magnitude of overall price changes relative to the FV (Amplitude) taken from Haruvy and Noussair (2006). "High amplitude indicates a lack of a tendency for prices to track fundamental values or to sell at a stable discount from the fundamental" (Haruvy & Noussair, 2006, p. 1136). The market values of these measures can be found in Table 5.3. The medians of these measures for high and low greed markets can be found in Table 5.4.

Using multilevel analysis, we first regressed prices, RD and RAD²¹ on standardized market dispositional greed (top Table 5.7); then we did the same analysis including all 11 standardized market control variables in a second regression (middle Table 5.7). We found a significant negative effect of dispositional greed on prices, RD and RAD. Furthermore, risk perception positively predicted prices, RD and RAD.

A Mann-Whitney U test indicated that asset prices were greater for low greed markets ($Mdn = 44.72$) than for high greed markets ($Mdn = 34.73$), $U = 21.0$, $p = .029$. RAD was higher for low greed markets ($Mdn = 0.63$) than for high greed markets ($Mdn = 0.28$), $U = 18.0$, $p = .015$. Similarly, RD was higher for low greed markets ($Mdn = 0.63$) than for high greed markets ($Mdn = 0.26$), $U = 18.0$, $p = .015$. With regards to RDMAX there was no difference between low greed markets ($Mdn = 1.27$) and high greed markets ($Mdn = 0.68$), $U = 26.0$, $p = .075$. For Amplitude there was no difference between low greed markets ($Mdn = 0.65$) and high greed markets ($Mdn = 1.40$), $U = 30.0$, $p = .143$. To summarize, we could not confirm our hypothesis that there are larger bubbles in markets populated by greedy traders. On the contrary, we found evidence to the effect that bubbles were in fact smaller and less severe in markets which consisted of greedy traders.²²

21 Note: RDMAX and Amplitude are measures on the market level and hence not included in the multilevel analysis. On the period level RDMAX was equal to RD, and Amplitude equal to zero.

22 Similar results were obtained using a Welch two sample t-test.

Table 5.7. Summary of Multilevel Models (uncontrolled displayed at the top and controlled displayed in the middle) with random intercepts (20 periods, 20 markets) for pricing, RD and RAD.

	Pricing		RD		RAD	
	<i>b</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Intercept	67.61***	10.38	0.53***	0.07	0.54***	0.07
Dispositional Greed	-9.39* (p = .024)	3.85	-0.19* (p = .024)	0.08	-0.19* (p = .020)	0.07
Intercept	42.79***	1.33	0.53***	0.05	0.54***	0.05
Dispositional Greed	-12.62** (p = .001)	3.32	-0.45** (p = .001)	0.12	-0.46*** (p = .001)	0.11
Loss Aversion (Lottery 1)	0.26	1.86	0.01	0.07	0.01	0.06
Risk Aversion (Lottery 2)	-0.48	2.85	-0.02	0.10	-0.01	0.10
Risk Perception	3.93*	1.82	0.14*	0.06	0.14*	0.06
Risk Preference (general)	-0.40	2.75	-0.01	0.10	0.00	0.09
Risk Preference (financial)	8.29	4.33	0.29	0.15	0.28	0.15
Financial Literacy	-0.67	3.06	-0.02	0.11	-0.01	0.11
Financial Literacy Others	-3.44	2.05	-0.12	0.07	-0.13	0.07
Illusion of Control	5.42	2.75	0.19	0.10	0.19	0.09
Experience	0.06	2.10	0.00	0.08	-0.00	0.07
Age	-1.21	2.06	-0.04	0.07	-0.05	0.07
Gender	-1.79	1.98	-0.06	0.07	-0.07	0.07
Random effects						
Variance of market intercept (level-2)	12.99 (3.60)		0.02 (0.13)		0.01 (0.12)	
Residual Variance	447.92 (21.16)		0.57 (0.76)		0.57 (0.75)	
R^2_{marginal}	.14		.14		.15	
$R^2_{\text{conditional}}$.17		.17		.17	

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; standard deviations in parentheses for random effects; R^2_{marginal} = variance explained by fixed factors, $R^2_{\text{conditional}}$ = variance explained by both fixed and random factors (Nakagawa & Schielzeth, 2013).

Discussion and Conclusion

We report on experimental asset markets in which we tested the effect of sorting participants into greedy and non-greedy markets on market-level indicators, particularly trading activity and bubble formation. To establish different trading environments, we sorted participants into high greed and low greed markets based on their score on the Dispositional Greed Scale, which we measured before trading. We expected to see more trading activity and larger bubbles in markets populated by greedy traders, based on the reasoning that their greedy inclinations might drive more impulsive trading and traders' greedy behaviors might reinforce each other. This reasoning was consistent with the typically assumed behavior of greedy financial market participants. However, although evidence pointed in the direction of increased trading activity for the greedy markets, we found no significant effects on trading activity. Furthermore, and contrary to expectations, we found markets with greedy traders to exhibit smaller bubbles than markets with less greedy traders. Bubbles were less likely and less severe in markets populated by greedy traders.

We believe that these findings are important, because of the many sources, including many scientific papers, treating the suggested relationship between greed and the emergence of asset market bubbles as a given. Following the 2008 financial crisis, greedy bankers and investors were seen as the culprits responsible for financial collapse and corporate greed was publicly condemned. Our findings are at variance with this account. Generalizing the findings of our study to accounts of greed and financial crises, we have to conclude that we did not find evidence to the effect that market greed contributed negatively to the dynamic of the financial crisis. These findings are strengthened by the observation of a previous study where researchers also did not find empirical support for the idea that the level of greed of individual traders predicted higher levels of trading activity in asset markets (Hoyer et al., 2021). Together the results of this and our study suggest that it is unlikely that the motivational drive of greed is responsible for asset market bubbles and crashes.

We can identify two important differences between the setting in our study and real-life trading that might provide alternative explanations for our observed results. First is individuals' awareness of the sorting. If bankers are indeed part of a "culture of greed", where greedy behavior has become the norm, they are likely also aware that their colleagues act out their greedy inclinations, and that it is normal to do so. Participants in our study were not informed about the bases on which the sorting into experimental asset markets took place. Perhaps the duration of the study was too short for a greedy norm to develop. Future research could inform participants about the nature of the sorting before the start of the market phase to investigate if this changes behavior. The results of Cheung et al. (2014) point into the direction that our treatment might be even stronger in the case of common knowledge about the greed sorting. In that sense, our findings of lower and less frequent asset market bubbles could be interpreted as a lower

bound. In other words, we presented here relatively conservative estimates of the effects. Second is the nature of the incentive structure. In real-life there is a system of “privatized gains and socialized losses” (Ritholtz and Task 2009, p. 3), replete with short-term financial incentives such as personal performance-based bonuses and stock option incentives. Bankers have been accused of taking risks with their clients’ money, prioritizing their personal bonuses over the long-term outcomes for their clients. In the current study, participants invested their own endowment and their final payoff depended on their own investment decisions. Awareness of a greedy norm combined with a “privatized gains and socialized losses” incentive structure (and also the dynamic nature of a trading floor) might have created a hot decision environment in real-life trading that our study could not emulate (Metcalf & Mischel, 1999). However, should this be the case then it does mean that, contrary to popular opinion, greed in itself is not enough to explain the emergence of asset bubbles or, more generally, the emergence of financial crises. Another crucial factor would be the incentive structure to the individual which, in interaction with dispositional greed, would create behaviors to this effect (Ekehammar, 1974). So, even if the alternative explanations would hold, our findings still impose important limits on previous, untested accounts of the consequences of greed.

Another important observation is that our findings are very much in line with the results of the market simulations by Lussange et al. (2019). In their simulations, markets with larger populations of preprogrammed “greedy” agents increased market stability. Likewise, in our results, more greedy agents in markets led to a decrease in price volatility, a diminution of market crashes and increase in trading volume. The combination of these results suggests that individuals motivated by greed might adopt a behavioral strategy to buy only if the price trend is expected to increase, but whether this is indeed the case should be topic of further research.

If our results translate into actual markets, this would suggest that as a society we may have been too quick in blaming the greedy bankers and investors for the 2008 global financial crisis. These findings shed light on the role of greed in the emergence of asset market bubbles in specific and of the financial crisis in general, and provide directions for future research.

SECTION III

THE GREEDY FRIEND

Chapter 6

Friends as Tools: Dispositional Greed in Social Relationships

This chapter is based on Hoyer, K., Zeelenberg, M., & Breugelmans, S.M. (2022).
Friends as tools: The relationship between dispositional greed and social
contacts. *Manuscript under review*

Greed is an insatiable desire to acquire more. It can be experienced over both material and non-material outcomes, but extant research mainly focused on economic decisions. So far, little is known about greed in the realm of social relationships, even though social relationships are an important part of people's lives and a predictor of wellbeing. In four studies, we investigated how dispositional greed is associated with various aspects of social relationships. We analyze both primary data and secondary survey data. Results reveal that greedy individuals are lonelier, objectify their friends more, and are both less satisfied with and less close to their social contacts. Greedy individuals have shorter relationships but talk to their friends more often. These findings shed light on the role of greed in shaping people's social lives.

- Preregistration (Study 6.3): https://aspredicted.org/EVR_WYU
- Preregistration (Study 6.4): https://aspredicted.org/NGD_GOK
- Materials (processed) data, and analyses scripts: https://researchbox.org/534&PEER_REVIEW_passcode=JGKT.
- Raw data and the corresponding code books for Study 6.1 and 6.2 can be freely downloaded at <https://www.dataarchive.lissdata.nl/>.
- Appendix: <https://osf.io/8trus/>

Greed is the insatiable desire to acquire more money and material possessions, but it can also be experienced for immaterial outcomes, such as food, sex, power, status and social relations (Seuntjens, Zeelenberg, Breugelmans, et al., 2015). Most research on greed to date has focused on its effects on economic and financial decisions, for example, vocational choice (Krekels & Pandelaere, 2015; Van Muijen & Melse, 2015), investment decisions (Hoyer, Zeisberger, et al., 2021b, 2021a), self-interested behavior (Bao et al., 2020; Seuntjens, Zeelenberg, Van de Ven, et al., 2015), having more income (Hoyer et al., 2022b), working harder to generate income (Okulicz-Kozaryn et al., 2021; Zeelenberg et al., 2020) and spending more, saving less, and having more debt during adolescence (Seuntjens et al., 2016). Greed has also been associated with a number of more psychological outcomes, such as emotional instability, lower self-esteem and worse mental wellbeing (e.g., Hoyer et al., 2022; Krekels & Pandelaere, 2015; Liu et al., 2019; Masui et al., 2018; Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Zeelenberg et al., 2020). In the current research, we examine how greed is related to an immaterial, yet very important feature of people's lives, namely their social relationships. Such relationships are of eminent importance for people's general functioning and well-being, just like material possessions can be. As will be outlined below, we have reasons to believe that greed directly relates to various aspects of social relationships, even beyond the desire to want more friends. Furthermore, we have reasons to believe that greed relates to treating friendships in a qualitatively different manner, going beyond the findings on greed and material possessions that usually focus on quantitative outcomes (e.g., wanting more, working harder, earning more, taking more). Before turning to the application of greed to social relationships, let us first explain in more detail what greed is and how individual differences in greed can be assessed.

Modern greed research started with the comprehensive review of Wang and Murnighan (2011), who summarized conceptual ideas from economics, politics, philosophy, game theory and psychology. They noticed: "Although greed has a long intellectual history, our review of the literature led to a rather surprising observation: empirical research on the personal and social dynamics of greed is rare." (p. 282). Wang and Murnighan's review was a catalyst for subsequent research on the role of greed in economic and organizational contexts. As we know now, greed is related to but also distinct from self-interest, materialism, envy, and maximization (cf. Seuntjens, Zeelenberg, Breugelmans, et al., 2015). Greed is limitless in the sense that greedy people always want more, even when more is not possible. A rational person knows that enough is enough, but greedy people do not, and continuously strives for more which, in the end, leaves them dissatisfied no matter what they have (Zeelenberg et al., 2020). We also know that not everyone is equally greedy. Greed appears to be a naturally distributed trait in populations (Krekels & Pandelaere, 2015; Preston & Vickers, 2014) that can be measured with several reliable and valid scales (Mussel et al., 2018; Zeelenberg et al., 2022).

We believe that people can also be greedy with respect to social relationships. There is substantial evidence that individuals with strong social ties are happier and more satisfied with life than others without these ties (e.g., Amati et al., 2018; Haller & Hadler, 2006), and having these ties might even be more important to life satisfaction than income (Powdthavee, 2008). We know that dispositional greed is associated with lower life satisfaction (Hoyer et al., 2022; Krekels & Pandelaere, 2015; Masui et al., 2018; Okulicz-Kozaryn et al., 2021; Seuntjens, Zeelenberg, Van de Ven, et al., 2015), which suggests the possibility that this is in part because greedy people cannot fulfill their desires in the domain of social relationships. Thus, we think it is important to extend research on greed to the domain of social relationships and how it is associated with life satisfaction or wellbeing through social relationships.

In addition to the associations between greed, relationships and wellbeing, there is another reason why the link between greed and social relationships is interesting to examine. The process of 'acquiring' social contacts is different from the process of acquiring material goods, which is where greed until now has been mostly studied. Because the process is different, studying the relationship between greed and social relationships could lead us to uncovering effects of greed that have been hitherto remained unknown. There are at least two features of acquiring social contacts that are different from acquiring material goods. First, social relationships require mutual selection (Newman et al., 2017), meaning that other people need to reciprocate one's desire in order to establish a social relationship (Curtis & Miller, 1986). This is a qualitatively different process from material purchase decisions, which are in essence unilateral and only involve decisions by a consumer (in other words: products do not choose their buyers). Second, the decision to become and stay friends is often an extensive and evolving process, involving spending time together and sharing experiences. There are multiple moments in the formation and maintenance of a social relationship where one of both parties can change their mind. In contrast, the decision to acquire a material good can often be effectuated instantaneously and is a momentary occasion. There is currently substantial evidence for greed influencing unilateral, single moment decisions (typically in the domain of economic or consumer decisions), but there is hardly any insight into how greed would operate in a lengthier, bidirectional, social context. For these reasons, we believe that expanding the range of behaviors related to greed into the social domain is important for understanding the scope of this motivation.

There is some initial empirical evidence that greed may affect relationships. Seuntjens Zeelenberg, Van de Ven, et al. (2015) found that dispositional greed predicts a desire for more friends on social media and for more casual sex when being single. Social relationships are an important indicator of life satisfaction. More generally, we know that people differ in their need for social relationships as demonstrated by the affiliation motive (Hill, 2009), and that this also applies to popularity on networking sites (Utz et al., 2012). Research on materialism, a construct closely related to greed, found that people with materialistic values use Facebook more frequently, have a larger number of Facebook friends and a higher

tendency to objectify and instrumentalize these friends in order to reach personal goals (Ozimek et al., 2017). Recent research by Hoyer et al. (2022), found that greedy individuals had more frequent sexual encounters, albeit shorter-lasting romantic relationships.

There are various theoretical reasons to expect that greed affects social relationships, even beyond the desire for having more friends. First of all, greedy individuals, compared to their less-greedy counterparts, might have different wishes and goals when it comes to social relationships. They might desire more friends to begin with and, especially, desire functional friends that they can use as tools to reach their (material) goals. Secondly, Wang and Murnighan's (2011) review already indicated potential interpersonal problems that may stem from greed. They write: "In essence, greed creates a sharp, direct conflict between self-interest and others' well-being; we suggest that this inevitable tension is the basis for the common view of greedy action—i.e., that it is socially reprehensible." (p. 283). Put differently, greedy people may not be the best company. Hence, the greediness of a person might also affect other people's willingness to engage in a relationship with them. Let us discuss both possibilities in more detail.

Greedy people may not be satisfied with the number of social contacts that they have, as they are generally dissatisfied with what they currently have. Hence, greedy people may be expected to desire more friends and they may also be expected to actively pursue that desire. Pursuing more friends, and dedicating time and effort to this pursuit (instead of maintaining and deepening existing social relationships) might cause them to feel less attachment to their existing social contacts, and perhaps even experience feelings of loneliness. This expectation is in line with ideas put forward by Fromm (1967), who in his book "To Have or to Be?" argued that greedy individuals have the propensity to view the environment and other people around them as commodities that can be acquired. He further argues that, in interpersonal relationships, greed manifests itself as a desire to have numerous acquaintances and the desire to have shallow romantic relationships with multiple partners: "[things] are utterly expendable, along with friends or lovers, who are expendable, too, since no deeper tie exists to any of them." (p. 122).

An additional expectation is that greedy individuals desire qualitatively different social contacts. We expect them to prefer functional relationships that can fulfill their needs without requiring too much in return, rather than intrinsically enjoying the company of others. For example, research has found that greedy individuals cheat on their partner more (Seuntjens et al., 2019) and that they are more susceptible to corruption (Li et al., 2021). Greedy individuals are also more self-interested and seem to care about others only when their own interests are aligned with the others (Bao et al., 2020; Seuntjens, Zeelenberg, Van de Ven, et al., 2015). As a result, greedy individuals are expected to view and treat their social contacts more as possession or a means to an end (i.e., objectification, which is a process of subjugation; Gruenfeld et al., 2008; Ozimek et al., 2017). They might

'use' their friendships more extensively in the beginning and interchange them as soon as they lose their value.

The second reason why we expect that greed has an impact on relationships is that greedy individuals tend not to be the nicest people to be close to, and – as was already discussed – relationships require mutual selection. In general, people do not aspire to be labeled greedy (e.g., Gilliland & Anderson, 2011), because this label has a very negative connotation. Greed is named as one of the sources of interpersonal conflict (Hoffman et al., 2018). What's more, all major religions see greed as a vice that causes egoistic behavior, harms others, and causes social strife (see, Oka & Kuijt, 2014; Sutherland, 2014). Greed is also empirically linked to immorality and unethical behavior (Li et al., 2021; Seuntjens et al., 2019). Furthermore, greedy individuals score low on the trait "agreeableness" (Big 5; Krekels & Pandelaere, 2015; Mussel & Hewig, 2016) and high on the trait "meanness" (Triarchic Model of Psychopathy Questionnaire; Mussel & Hewig, 2016), indicating, among other things, deficient empathy (Seuntjens Zeelenberg, Van de Ven, et al., 2015), lack of close attachments with others and egocentrism. As a result, relationships, if they even come about, might drift apart early or not develop beyond the stage of casual relationships.

Overview of the Current Studies

Our exploration of the associations between individual differences in greediness and various aspects of social relationships comprises four studies. Study 6.1 explored data from large representative samples of the Dutch population (N between 2299 and 4943), and Study 6.2 replicated these results in a later wave of this large sample (N between 1816 and 2341). Study 6.3 explored this relationship further in a Dutch student sample ($N = 203$, preregistered). Finally, Study 6.4 is a preregistered replication ($N = 503$) of the main insights from Studies 6.1-6.3, using a US American sample from Prolific Academic. Because the setup of all studies was very similar, we report them together below for reasons of brevity. We report all data exclusions and all measures.

We report on two types of relationships measures that go beyond the simple desire to acquire more friends, namely measures that consider people's needs fulfillment when it comes to social relationships (such as satisfaction with social contacts and loneliness), and measures that concern how people look at and treat their social relationships (such as objectification, inclusion of others in self, and how long they know and how often they talk to their closest contacts). We expect that greedy individuals are less satisfied with their social contacts (since they are generally dissatisfied with what they currently have) and experience more feelings of loneliness (since they are dissatisfied and also establish fewer deep ties with their social contacts). Furthermore, we expect greedy people to objectify their friends more (since they view their social contacts as objects to acquire), feel less connected to their social contacts (since they easily exchange social contacts

for others and are constantly searching for new friends instead of establishing deeper ties with their existing contacts), know their closest contacts for a shorter time (since they easily exchange their social contacts and the other might end the relationship prematurely), but talk to their social contacts more often (since they 'use' them extensively before interchanging them). Data, code and materials for all studies can be found at: https://researchbox.org/534&PEER_REVIEW_passcode=JGKTCJ.

Method

Participants

Study 6.1

This study is our initial exploration of the relationship between greed and social contacts using a sub-sample of the LISS (Longitudinal Internet Studies for the Social Sciences) panel²³, a large representative sample of the Dutch population that consists of 5,000 households, comprising approximately 7,500 individuals.

Participants completed the Dispositional Greed Scale²⁴ (DGS, Seuntjens, Zeelenberg, Van de Ven, et al., 2015) and the Personality, and Social Integration and Leisure questionnaires from the LISS core study (LISS wave #6, 2013). We only included participants who completed both the DGS and the relevant items of the questionnaire. The sample consisted of $N = 2299-4943$ participants depending on the measure (53.7% Female; $M = 51.88$, $SD = 17.19$).

Study 6.2

This study replicated Study 6.1 using a later wave of the LISS panel. Participants completed the Dispositional Greed Scale²⁵ (Seuntjens, Zeelenberg, Van de Ven, et al., 2015) and the Personality, and Social Integration and Leisure questionnaires from the LISS core study (LISS wave #11, 2018-2019). We only included participants who completed both the DGS and the relevant items of the questionnaire. The sample consisted of $N = 1816-2341$ participants depending on the measure (51.1% Female; $M = 54.37$, $SD = 17.90$). In total, 1452 participants of this sample also completed the 2013 wave used in Study 6.1, with a test-retest reliability of the DGS of $r(1452) = .63$ at $p < .001$.

Study 6.3

Participants were first-year Psychology students from a Dutch University, recruited in April 2019. Prior to analyses, we excluded one participant who did not finish the DGS, leaving a total sample of $N = 205$ (72.2% Female; $M = 20.21$, $SD = 2.40$). This study was preregistered at https://aspredicted.org/EVR_WYU.

²³ For more information: www.lissdata.nl.

²⁴ The DGS was part of the 2013 single wave study '155 Dispositional Greed Scale'.

²⁵ The DGS was part of the 2019 single wave study '198 Motives for greed and self-interest'.

Study 6.4

In this study we aimed to replicate the main findings of Studies 1, 2 and 3 in a sample from the USA. Participants were recruited through Prolific in August 2019 ($N = 503$; 46.7% Female; $M = 29.66$, $SD = 9.91$). This study was preregistered at https://aspredicted.org/NGD_GOK.

Materials and Procedure***Dispositional Greed Scale (DGS)***

Individual differences in greed were measured in all studies with the 7-item DGS (Seuntjens, Zeelenberg, Van de Ven, et al., 2015). This scale consists of statements like “I always want more.” Participants indicated to what extent they agreed with each of these statements on a 5-point Likert-type scale (1 = Strongly disagree; 5 = Strongly agree; $\alpha_{s1} = .89$; $\alpha_{s2} = .90$, $\alpha_{s3} = .81$; $\alpha_{s4} = .81$). The DGS has been translated and validated in Russia (Poluektova et al., 2015), Japan (Masui et al., 2018), China (Liu, Sun, Ding, et al., 2019), Brazil (Freires et al., 2019), and Belarus (Fourmanov & Shirko, 2020). The scale performs well, also compared to other greed scales (Zeelenberg et al., 2022). In Studies 3 and 4, half of the sample started with the DGS; the other half ended the questionnaire with the DGS²⁶.

Measures of Relationships and Relationship Quality

Loneliness was assessed with the 6-item Loneliness Scale by De Jong-Gierveld and Kamphuis (1985). Example items are: “I have a sense of emptiness around me”, and “there are enough people to whom I feel closely connected” (rated on a three-point scale, with 1 = Yes, 2 = More or less, and 3 = No). A higher score represents more feelings of loneliness.

In Studies 6.1, 6.2 and 6.4, the closeness experienced in relationships was assessed by the Inclusion of Other in Self-scale (IOS; Aron et al., 1992). In the IOS scale participants assess the degree to which they generally feel connected to other people, using 7 circles that depict different degrees of overlap between the circles “Self” and “Other”. A lower score represents less connection with others.

Relationship satisfaction was assessed by the single item “How satisfied are you with your social contacts?” (0 = not at all satisfied; 10 = very satisfied). Participants were also asked the names of their (at most) five closest contacts. They were then asked how long they have known these persons (1 = less than a year, 2 = 1 to 3 years, 3 = 3 to 5 years, 4 = longer than 5 years) and how often they talk to them (1 = daily, 2 = weekly, 3 = monthly, 4 = quarterly, 5 = yearly, 6 = less than once a year)²⁷.

26 The mean scores of participants who filled out the DGS at the beginning of the survey in Study 6.3 ($M = 2.52$, $SD = 0.68$) did not differ significantly from those who filled it out at the end of the survey ($M = 2.51$, $SD = 0.69$), $t(203) = -0.07$ and $p = .943$. The mean scores of participants who filled out the DGS at the beginning of the survey in Study 6.4 ($M = 2.82$, $SD = 0.75$) did not differ significantly from those who filled it out at the end of the survey ($M = 2.74$, $SD = 0.74$), $t(501) = 1.35$ and $p = .178$.

27 Note that the scales in the LISS panel questionnaire were slightly different.

Studies 6.3 and 6.4 included the 10-item Objectification Scale (Gruenfeld et al., 2008), a measure of individual differences in the objectification of friends. In the items the term “this person” was changed to “my friends”. Sample items include: “I think more about what my friends can do for me than what I can do for them” and “I tend to contact my friends only when I need something from them” (1 = strongly disagree, 7 = strongly agree).

Study 6.3 also included a number of additional relationship questions taken from the Cambridge Friendship Questionnaire (Baron-Cohen & Wheelwright, 2003) and from the McGill Friendship Questionnaire - Friendship Functions (Mendelson & Aboud, 1999), and some single items. Because these were only assessed in Study 6.3, we do not report them here. A full description of these measures and the results can be found in Appendix 6.1.

Results

We conducted two sets of analyses. First, we analyzed the results from all four studies separately, exploring correlations between dispositional greed and the various measures of relationships and relationship quality. Next, we conducted a meta-analysis of the correlations from the different studies. Results from all studies and the meta-analysis can be found in Table 6.1.

Studies 6.1 and 6.2

In both samples from the representative panel, we found negative correlations between the DGS and the IOS, positive correlations between the DGS and the loneliness scale, and negative correlations between greed and satisfaction with social contacts. With regard to participants’ closest contacts, we found negative correlations with relationship length, positive correlations with frequency of talking and no significant correlations with the number of names mentioned (at most 5).

Study 6.3

Replicating Study 6.1 and 6.2 in the sample of Dutch students, we found a positive correlation between the DGS and the loneliness scale, and a negative correlation between greed and satisfaction with social contacts. With regard to participants’ closest friends, we found no significant correlation with the number of names mentioned (at most 5) or relationships length, and frequency of talking (in contrast to Study 6.1 and 6.2). Furthermore, we found a positive correlation between the DGS and the objectification scale.

Study 6.4

Similar to Studies 6.1, 6.2 and 6.3, in this sample of US Prolific participants we found a positive correlation between the DGS and the loneliness scale. We did not find a correlation between greed and satisfaction with social contacts (in contrast to Studies 6.1, 6.2 and 6.3). With regards to participants’ closest friends,

we found no correlation with the number of names mentioned (at most 5), a negative correlation with relationship length (similar to Study 6.1 and 6.2), and no correlation with frequency of talking. We also found a positive correlation between the DGS and the objectification scale (similar to Study 6.3).

Meta-Analysis: Correlations

To combine the results from the previous four studies, we performed a meta-analysis on correlation coefficients using fixed effects models based on Fisher's z transformation of correlations. We used the function "metacor" from the "meta" R package (version 4.18-0, Schwarzer, 2012). We found positive correlations between the DGS and the loneliness scale, the objectification scale and the frequency of talking to the (at most) five closest contacts. We found negative correlations between greed and satisfaction with social contacts, the IOS, and the relationship length. We found no correlation with the number of names mentioned.

Table 6.1. Correlations between the Dispositional Greed Scale and Various Measures of (Evaluations of) Social Relationships.

	Study 6.1	Study 6.2	Study 6.3	Study 6.4	Meta-analysis
	LISS-Panel 2013	LISS-Panel 2019	Dutch students in the lab	US Prolific participants	
Loneliness	$r(4943) = .14^{**}$	$r(2289) = .14^{**}$	$r(204) = .16^*$	$r(503) = .17^{**}$	$\bar{r} = .14^{**}$
IOS	$r(2299) = -.14^{**}$	$r(2341) = -.16^{**}$	--	$r(503) = -.03$	$\bar{r} = -.12^{**}$
Satisfaction with social contacts	$r(4841) = -.17^{**}$	$r(2216) = -.14^{**}$	$r(204) = -.14^*$	$r(503) = -.04$	$\bar{r} = -.13^{**}$
5 closest friends					
Names mentioned	$r(4991) = .00$	$r(1850) = -.01$	$r(205) = -.12$	$r(503) = -.05$	$\bar{r} = -.01$
Relationship length	$r(4243) = -.17^{**}$	$r(1816) = -.16^{**}$	$r(203) = -.09$	$r(503) = -.10^*$	$\bar{r} = -.15^{**}$
Frequency of talking	$r(4305) = .10^{**}$	$r(1840) = .12^{**}$	$r(203) = .02$	$r(503) = .02$	$\bar{r} = .08^{**}$
Objectification	--	--	$r(203) = .32^{**}$	$r(503) = .41^{**}$	$\bar{r} = .38^{**}$

Note: Greed was measured using the Dispositional Greed Scale (Seuntjens, Zeelenberg, Van de Ven, et al., 2015). Loneliness was measured using the Loneliness scale (De Jong-Gierveld & Kamphuis, 1985). IOS is the Inclusion of Other in Self scale (Aron et al., 1992). Objectification was measured using the Objectification Scale (Gruenfeld et al., 2008). * $p < .05$; ** $p < .001$

Discussion

We started our research from the observation that greed has been studied as an important motive in economic behavior and in the pursuit of material gains, but that very little is known about its association with life outcomes in the social domain. We argued that it is important to study these associations because social contacts are an important indicator of wellbeing. In addition, they are governed by reciprocal and repeated processes, which differ from the unilateral and single-shot processes that are more typical of material acquisitions. We conducted four studies on how dispositional greed is associated with various aspects of social relationships. What did we learn?

Together, the studies revealed that greedy individuals objectify their friends more and that they experience more feelings of loneliness. In addition, greedy individuals tended to be less satisfied with and less close to their social contacts, to have had shorter relationships, but talk to their social contacts more often. This paints the picture of greedy people committing less to the relationships that they have and that they switch to new relationships more easily and quickly. Features of dispositional greed are the tendency to be dissatisfied with what one already has and the insatiable desire to acquire more (Seuntjens, Zeelenberg, Breugelmans, et al., 2015). In our findings, we clearly see a reflection of the general characteristics of greed that have been documented before for material outcomes, but also some new insights into how greed relates to social outcomes that may explain why greed is generally not viewed in a positive light. Although we find this to be an important finding in itself, we also think that our results go beyond such generalization.

The findings on objectification and loneliness suggests that social relationships may play a qualitatively different role in the lives of more greedy individuals. The positive correlation between the DGS and the objectification scale indicates that greedy individuals have a tendency to view their social contacts as tools to get what they want, that is, as a means to an end. Friends are seen as instruments for goal attainment and approached on the basis of their utility, rather than being valued for their other human qualities (Gruenfeld et al., 2008). The tendency to objectify social relationships could mean that greedy individuals do not differentiate between material and social outcomes in the same way that less greedy individuals do. Alternatively, it could mean that less greedy individuals have a lesser tendency to objectify, and as a result view economic or material interactions more in terms of social relationships (social preferences; Van Dijk & De Dreu, 2021). In either case, the differences between more and less greedy people in approaching material and relational decisions would be interesting to explore in further studies.

The view of friends as tools might have its benefits. As DeSciolo and Kurzban (2011, p. 209) noted: "social psychologists have long claimed that people's friendship choices are surprisingly unintelligent, based on strategically irrelevant factors such as proximity, familiarity, similarity, or very simple reinforcement learning", whilst animals, such as primates and dolphins, more strategically choose their 'friends'.

They argue, however, that human friendships can also be strategic. Indeed, it has been argued and shown that the moral emotions that people feel towards others are dependent on the usefulness of these people in future interactions (Nelissen, 2014). The greedy approach to friendships can be seen as what DeSciolo and Kruzban call strategic alliance-building, indicating that greedy individuals may have a more rational approach to friendship selection, than their non-greedy counterparts. Greedy individuals have already been shown to employ more rational strategies in economic games (i.e., keeping more money for themselves; e.g., Seuntjens, Zeelenberg, Van de Ven, et al., 2015), to be more likely to take a bribe (Seuntjens et al., 2019), to be more corrupt (Li et al., 2021), and to exhibit more rational behavior in economic markets (Hoyer, Zeisberger, et al., 2021a). However, even if a more objective, instrumental view of social relationships may have economic benefits, there may be a psychological price to pay.

The view of friends as tools may, next to its strategic aspects, also have ramifications for the psychological benefits of having social relationships in the sense that greedy people feel lonelier. Perlman and Peplau (1981) defined loneliness as “the unpleasant experience that occurs when a person’s network of social relations is deficient in some important way, either quantitatively or qualitatively” (p. 31). In our studies we found that greedy people differ from less greedy people both in terms of quantitative aspects of their social relations (e.g., duration) and in terms of qualitative aspects of their social relations (e.g., objectification). This may in part explain why they feel lonelier. The consequences of this loneliness can be quite severe including both physical and mental health problems, like social anxiety, depression, and cardiovascular problems (Heinrich & Gullone, 2006). Thus, there may be a clear trade-off between a greedy, instrumental view of social relationships that yields greater material pay-off and a less greedy, relational view that yields greater psychological pay-off.

An interesting observation in our data was that greedy individuals tend to have shorter relations. We envisage at least two reasons why this is the case. On the one hand, this result, combined with the negative relationship with IOS, could indicate that the greedy feel less connected to their social contacts and perhaps stop investing in their relationships as soon as they lose their functionality and exchange them for new friendships (as can be done with objects), meaning that it is their own choice to end the relationship. It could, however, also be that this decision comes from the other end of the relationship, since, as mentioned, greedy individuals are not the nicest people to be with and are sources of interpersonal conflict. Further research could investigate this in order to develop interventions that help greedy individuals maintain relationships, and as a result, decrease loneliness.

Another avenue for future research could be to investigate whether greedy individuals employ tactics in order to increase the functionality of their existing social relationships, like Machiavellians do (Abell et al., 2016). Such tactics include, for example, emotional manipulation strategies (e.g., deliberately embarrassing

a friend to stop them behaving in a particular way), mood worsening strategies (e.g., displaying anger to motivate others), and inauthentic strategies (e.g., sulking to get someone to change their behavior). Since greed has already been linked to unethicity (Li et al., 2021; Seuntjens et al., 2019), it would not be surprising if greedy individuals indeed engage in such tactics in order to achieve their desires.

To summarize, greed may appear to be primarily a materialistic motive, but it has surprising effects on social relationships as well. Greedy people are less satisfied with, and less close to their social contacts, having friendships that involve more contact but that are also more short-lived. Even more, greedy people tend to view their friends more like tools, needed to achieve their ambitions. This may lead to greater economic and material success, but also to greater feelings of loneliness. This may help to explain why greedy people, despite an abundance of friends, score low on satisfaction-with-life and general well-being.

Chapter 7

Discussion and Conclusion

The previous chapters looked at greed's antecedents and consequences for success in life, for trading and for social relationships. In this Chapter, I first summarize the findings for each empirical chapter and then answer the questions posted in the Introduction. Specifically, I will discuss whether greed should be considered a mental disorder, whether greed is good or bad, and whether my definitional choice still withstands considering the results. Finally, I discuss the limitations, potential interesting questions for future research, and draw an overall conclusion.

Summaries of the Chapters

This dissertation was divided into three sections: Becoming and staying greedy, the greedy trader, and the greedy friend. The first part focused on two of the open questions identified in the Introduction, namely what the origins of greed are, and whether there is also something good about greed. In the second part I looked at the link between greed and trading behavior in order to gather some first evidence to answer the question whether greed is really the cause of the financial scandals and crises. In the third, and final, part, I looked at the effect of greed on social relationships.

The aim of Chapter 2 was to examine the relationship between the economic circumstances at childhood (i.e., growing up poor or wealthy) and adult dispositional greed. I aimed to replicate the results of Liu et al. (2019), who in a large study with Chinese adolescents found support for the Luxury hypothesis, the idea that growing up wealthy would be related to higher levels of dispositional greed in adulthood, and not for the Scarcity hypothesis, the idea that growing up poor would be related to higher levels of dispositional greed. The generalizability of these findings may be limited, due to China's one-child policy and socioeconomic policies which may have led to fewer differences in wealth. Therefore, I replicated this research in two other cultural contexts that represent markedly different socioeconomic policies: the Netherlands and the USA. I found support for the luxury hypothesis in both of our samples and found a moderating role of number of siblings on the relationship between CSES and greed in our Dutch, but not in the American sample.

Chapter 3 concerned the question: What is greed good for? On the one hand, greed has often been condemned as sinful, immoral, and harmful for others. On the other hand, greed is also seen as an important motive driving human behavior and economic development. In a representative sample of the Dutch population, we studied relationships between greed and a number of indicators of economic, evolutionary and psychological success, similar to the approach that Eriksson et al. (2020) recently used to study the benefits of selfishness. We found that greedy individuals had more economic success (i.e., higher household income), sometimes more and sometimes less evolutionary success (i.e., more sexual partners, but fewer children and shorter lasting romantic relationships) and less psychological success (i.e., lower well-being), than their less greedy counterparts. A second

goal of this chapter was to disentangle the relationship between greed and self-interest. Greed differed from self-interest in terms of economic success, and partly in terms of evolutionary success (with greed being slightly more advantageous), but they are similar in terms of psychological success.

Chapter 4 looked at the link between greed and individual trading behavior. Both the popular press as well as scientific articles have mentioned questionable practices by greedy bankers and investors as one of the root causes of the 2008 global financial crisis. Despite these suggestions, there was no substantive empirical evidence for a contribution of greed to individual trading behavior. This chapter presented the result of 15 incentivized experimental asset markets, in which participant could buy and sell fictitious assets. Contrary to expectations, I did not find empirical support for the idea that greedier investors trade fundamentally different from their less greedy counterparts in markets. Chapter 4 was a first step in having more clarity about the extent to which greed may have contributed to financial crises.

Birds of a greedy feather often flock together, meaning that greedy individuals are likely to end up in financial professions and, as a consequence, be surrounded by other greedy individuals (Krekels & Pandelaere, 2015; Van Muijen & Melse, 2015). In Chapter 5, I investigated the relation between the motive of greed and several asset market indicators such as trading activity and bubble formation. I ran experiments in which I created markets populated with greedy and markets with non-greedy investors. Interestingly, high-greed markets exhibited less frequent and smaller price bubbles than markets with less greedy traders. As for trading activity, I found only weak evidence that greedier individuals show higher trading activity. If my findings translate to actual markets, these findings suggest that, contrary to common suggestions, greed might not contribute negatively to the emergence of financial crises.

Finally in Chapter 6, I investigated greed in the realm of social relationships. Most research focused on greed in relation to economic decisions, but social contacts are also an important part of people's lives and a predictor of well-being. In four studies, I investigated how dispositional greed is associated with various aspects of social relationships, making use of both primary data as well as secondary survey data. Results revealed that greedy individuals are lonelier, objectify their friends more, and are both less satisfied with and less close to their social contacts. Greedy individuals have shorter relationships but talk to their friends more often.

Questions Posed in the Introduction

In the Introduction, I started with the observation that greed in the late 1800s was seen as a cause of mental illness and a reason to land yourself in a mental asylum, but that the current DSM-5 has not listed greed as psychiatric disorder. The DSM-5 defines a mental disorder as "a syndrome characterized by clinically

significant disturbance in an individual's cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities" (American Psychiatric Association, 2013, p. 20). In my opinion, greed should not per definition be classified as a mental disorder. Being greedy does not have to be problematic, to lead to severe consequences or to be a cause of mental dysfunction. Extreme forms of greed, however, and its strong and insatiable desire for more, could develop into a Hoarding Disorder and other mental disorders. Research indeed shows that dispositional greed correlates with hoarding behaviors (Yoshino et al., 2021). Additionally, the constant dissatisfaction, which is an inevitable aspect of greed, and its psychological and social consequences, such as a lower satisfaction with life (Chapter 3), shorter (romantic) relationship (Chapter 3 and 6), and increased experiences of loneliness (Chapter 6), could certainly lead to mental dysfunction, which could develop into a mental disorder such as Depression²⁸ or Anxiety.

Furthermore, following the reasoning of Everitt (2021), I believe there are parallels between greed and addiction²⁹, even though addiction was classified only as peripheral to greed in the prototype analysis by Seuntjens, Zeelenberg, Breugelmans, et al. (2015): An addict is motivated by a strong desire to obtain the object of one's addiction; A greedy individual is motivated by a strong desire to obtain the object of one's greed. Ralph Crawshaw (1996), a psychiatrist, noted that people can be greedy for things such as money and power, and indeed also for mind-altering substances. According to the DSM-V someone is addicted when someone "continues using the substance despite significant substance-related problems" (American Psychiatric Association, 2013, p. 483). It lists 11 criteria that characterize the severity of the addiction. These criteria can be divided into four basic categories: impaired control, social impairment, risky use, and pharmacological (American Psychiatric Association). I would like to highlight five of those criteria which I believe can easily be experienced by a greedy person, namely: spending a great deal of time obtaining, using, or recovering from the object of addiction (criterion 3), intense cravings for the object of addiction (criterion 4), social/interpersonal problems related to the object of addiction (criterion 6), failure to abstain from the object of addiction despite problems caused by it (criterion 9), and needing more and more of the object of addiction to get the desired effect (criterion 10). Greedy people can certainly be preoccupied by their desire to acquire more and spend a lot of time thinking about and trying to acquire the desired object. This excessive focus on acquiring more may result in a tunnel vision, a focus on the immediate benefits, and the neglect of

28 Seuntjens, Zeelenberg, Van de Ven, et al. (2015) and Seuntjens et al. (2016), however, did not find a correlation between greed and Beck Depression Inventory (Beck, 1967).

29 Notably, we can make a distinction between substance addiction and behavioral addiction (e.g., Grant et al., 2010). Substance addiction includes addictions to, for example, alcohol, cannabis, and opioids. Behavioral addiction includes addictions to, for example, gambling, and, though not listed in the DSM-V, stealing, shopping, sex, and gaming.

someone's long-term interests and others around them (Seuntjens, Zeelenberg, Breugelmans, et al., 2015). Their lives revolve around a quest to accumulate as much as possible and they might be unable "to redirect their drives and desires to other and higher things" (Burton, 2014a, para. 10). This acquisition pursuit might cause a powerful, yet temporary, surge of dopamine in the nucleus accumbens, the brain's reward center, similar to certain substances (Breiter et al., 2001; T. Schwartz, 2010). As apparent from the literature and this dissertation, greed can lead to financial, psychological, and social problems. Notably, the presence of four to five symptoms classifies as moderate substance use disorder, and severe by six or more symptoms (American Psychiatric Association). I am definitely not claiming that all addicts are greedy, addiction is a very serious problem, nor that all greedy individuals are addicts. What I am claiming, however, is that greedy individuals can, in an extreme form, be addicted to acquiring more. Even though the potential overlap between extreme forms of greed and addiction at this point is purely speculative, and more research is definitely needed, if such a relationship indeed exists, then perhaps the treatments offered to addicts, which have received ample research attention, could also prove effective in tempering greed and reducing its negative consequences. Moreover, we might be able to deduce new information about dispositional greed based on what we know about addiction.

The second question I raised in the Introduction, is whether greed is good or bad. As we have seen, greed is often perceived as a negative trait that causes harm-to-others. Greed is seen as excessive, and anything in excess is generally considered to be bad. At the same time it is hailed to be the engine of economic growth (Bruhn & Lowrey, 2012; Greenfeld, 2001) and deemed essential to survival (Jett, 2000). I would like to split this broad question into two components, namely: is greed good or bad for the greedy individuals themselves and is greed good or bad for society as a whole.

Chapter 3 was entirely devoted to this first component. Dispositional greed had positive as well as negative consequences, so depending on how you look at it, it can be classified both as being good and bad. Chapter 3 showed that greedy people generate more resources but are not necessarily happier. This unhappiness might be an intrinsic property of greed: the endless pursuit of more and the constant dissatisfaction of never having enough, which are core characteristics of greed, may by necessity imply a lower satisfaction with life in general. It could, however, also be the case that the greedy feel less satisfied with life due to the fact that, for example, their relationships are shorter lasting, and their families are smaller. Having good social relationships is crucial to well-being (e.g., Amati et al., 2018; Haller & Hadler, 2006), even more so than having a good income (Powdthavee, 2008). On the other hand, I also believe that greed motivates people to attain their goals, even though this was not tested in this dissertation. According to the Oxford Dictionary (n.d.), ambition can be defined as "a strong desire to do or achieve something", a definition that shows some overlap with the definition of greed. According to Burton (2014b), highly ambitious people might also experience constant dissatisfaction. Schwartz et al. (2002, p. 1194) highlights the positive

attributes of a maximizing mind-set (a concept closely related to greed, yet not identical): “it seems that there are real advantages to adopting a maximizing strategy. Presumably, not being satisfied with “good enough” spurs one on to achievements that less ambitious people will not attain”. The word maximizing in this quotation can easily be replaced with greed, since greedy people’s strong desire and dissatisfaction with the current situation can also drive them to achieve more. Furthermore, Greed might enhance job prospects, since greedy people are voracious in seeking out as many opportunities as they can, and experiences are the most effective way to learn new skills (Willyerd & Mistick, 2016). So clearly, on an individual level there is a case to be made for greed being good as well as greed being bad.

But what about society as a whole? In the Introduction, we have seen some clear examples in which greed was destructive and harmed society as a whole. Indeed, people base their judgments of others’ greed not only on its acquisitiveness, but also on the degree to which this behavior results in harm to others (Helzer & Rosenzweig, 2020). Whether all those accusations are actually justified, however, is not entirely sure, as Chapter 4 showed that greedy individuals do not trade fundamentally different from their nongreedy counterparts. Putting greedy individuals together might actually result in fewer and less severe economic bubbles (Chapter 5). Having fewer children, which was the case for those scoring high on greed (Chapter 3), might also benefit society, as research has shown that having one fewer child could save approximately 58.6 tons of CO₂-equivalent emissions each year in developed countries (Wynes & Nicholas, 2017). In line with the argument about ambition that was previously made, I second the idea put forward by economists that greed increases economic development by motivating people, who want to enrich themselves, to develop new industries and create new products (Melleuish, 2009). Lewis (2002), author of the best-selling *Sin to Win: Seven Deadly Steps to Success*, adheres to this notion: “No business would ever have got off the ground if it weren’t for avarice. No invention would ever have been brought to market, no factory constructed, no coal dug out of the ground, no crop ever sown. If everyone had strictly observed the rule against avarice since the beginning of time, we’d still be living in caves.” (p. 149). Without greed we would not have many of the conveniences of modern living (Fitzpatrick, 2003; Melleuish, 2009). Again, at a societal level, there is a case to be made for greed being good as well as greed being bad.

Overall, greed can be a good motivator, enhance job prospects and even drive economic growth. On the other hand, it causes dissatisfaction with life and may lead to, among other things, fraud and corruption. I believe that there might be a fine line between flourishing ambition and destructive greed. If we ensure that greed does not tip over into destructiveness, for ourselves and for others, it might be completely fine to be somewhat greedy. Even Mother Teresa was greedy according to Pagliarini (2011)—greedy in her quest to serve the poorest of the poor. It is excessive greed that is causing negative outcomes for individuals themselves as well as society as a whole.

Throughout this dissertation, I used the definition of greed coined by Seuntjens, Zeelenberg, Breugelmans, et al. (2015), namely that greed is the “experience of desiring to acquire more and the dissatisfaction of never having enough” (p. 518), and the corresponding Dispositional Greed Scale (Seuntjens, Zeelenberg, Van de Ven, et al., 2015). As mentioned in the Introduction, this definition allows for desires other than monetary and material desires, does not include a desire that necessarily leads to harm-to-others, or a retention motivation. Given the results of the empirical chapters, I stand by my choice to use this definition. Let me explain why.

Firstly, I clearly see a reflection of the general characteristics of greed: acquisitiveness and insatiability. This was, for example, directly and indirectly, apparent from Chapter 3, where greedier people reported a lower satisfaction with life, and Chapter 6, where greedier individuals felt lonelier and were less satisfied with their social contacts. Secondly, Chapter 3 and 6 also point out that greed transcends monetary and material desires, as it showed that greedy individuals also approach (romantic) relationships differently. The greedy had more sexual partners, but shorter romantic relationships and fewer children (Chapter 3), and, interestingly, they seem to treat their friends as if they were objects (Chapter 6). Thus, although the desire for more money or material goods is clearly an important part of greed, this does not mean that people cannot be greedy for non-material desires. Thirdly, even though sometimes acting greedily might indeed harm others (e.g., the objectification of friends in Chapter 6), this was not always the case, and sometimes even the opposite was true. Trading-wise, for example, the greedy simply seem to blend in with the non-greedy (Chapter 4) and populating a market with only greedy individuals might actually reduce the number and severity of economic bubbles (Chapter 5). As mentioned, having fewer children (Chapter 3), might even benefit the climate (Wynes & Nicholas, 2017). Hence, negative outcomes for others are often a consequence of greed rather than a necessary condition of greed. Finally, Chapter 6 seems to suggest that the acquisition motive, rather than the retention motive, is more central to the experience of greed: greedy individuals have shorter relationships and less connected to their social contacts and perhaps stop investing in their relationships as soon as they lose their functionality and exchange them for new friendships (as can be done with objects), thus, suggesting a focus on acquiring more (functional) friends rather than retaining existing relationships.

Limitations and Future Directions

In this subsection, I would like to draw your attention to some limitations of the studies presented and suggest possible directions of future research based on the findings of this dissertation. First of all, like most empirical literature concerning the behavior of traders, I investigated the behavior of student participants (in Chapter 3 and 4), and not the behavior of “the main protagonists in financial markets: financial professionals” (Weitzel et al., 2020, p. 2,660), which might limit

the external validity of these chapters. Even though there is some evidence on how the behavior of financial professionals compares to the behavior of students in experimental asset markets (Weitzel et al.), I should still be cautious in claiming that my research can be generalized to the professional bankers and investors. These chapters are only one step in having more clarity about the extent to which greed may have contributed to the 2008 financial crisis.

Furthermore, the greedy trading behavior of bankers might be driven by an interplay between situation and personality, that was not present in my experimental asset markets in Chapter 3 and 4. Future research should investigate situational greed, and more specifically, it should look, for example, at the effect of incentive structures, competition, hot decision environments (Metcalf & Mischel, 1999), and a culture of greed on trading behavior to paint a more complete picture. I would be interesting to investigate ways to manipulate and induce greed. Mussel et al. (2015) and, following their lead, Li et al. (2021), attempted to activate greed by having participant read a fictitious biography of a successful and greedy person. In the other state-modest condition participant also read a biography of a successful person, but this person was more modest. Again, however, the question arises whether modesty is truly the opposite of greed. Furthermore, this manipulation could lead to two things: it could indeed make people greedy, but it could also simply set the norm that greedy behavior is ok.

Chapter 4 and 5 raise an interesting question about the relationship between greed and risk-taking. Following the 2008 financial crisis, news headlines were full of stories of individual and corporate greed (Mason, 2009). Greedy bankers and traders were depicted as the culprits of financial decline. Mazumder and Ahmad (2010, p. 113), for example, named the “greed of Wall Street investment bankers who took excessive risk” as one of the causes of the crisis. Although this link between greed and risk-taking is often suggested, findings to this effect are contradictory. Mussel et al. (2015) found that in a sample of 20 male economics students greed predicted risk-taking in the balloon analogue risk task (BART; Lejuez et al., 2002). Their participants were informed that the participant with the highest fictive account balance would win a bonus of 100, which might obscure their measurement, as it makes their task not only a measurement of risk-taking, but also a measurement of competitiveness. Seuntjens, Zeelenberg, Van de Ven, et al. (2015), using the Holt and Laury (2002) lottery in a sample of 236 psychology students, found no relationship between greed and risk-aversion. Li et al. (2019) found no significant correlation in games about only gains or only loses but did find a relationship with risky choices in mixed gambles. In Chapter 3, I found no significant correlations between greed and any of the risk measures, whilst in Chapter 4, I found that greed is correlated with self-reported willingness to take risk in general and willingness to take financial risks, but not with the incentivized risk task. Interestingly, in a study that is outside of the scope of this dissertation, I found a link between greed and risk-taking, measured with the Domain Specific Risk-Taking scale (DOSPRT; Blais & Weber, 2006). Specifically, greed was correlated with risk taking in the financial, health-safety, and ethical domain, but not in the

social and recreational domain. The relationship between greed and risk-taking was mediated by self-control and temptation. Future research should explore this relationship further.

Previous research (Krekels & Pandelaere, 2015; Li et al., 2021; Masui et al., 2018; Seuntjens, Zeelenberg, Van de Ven, et al., 2015; Zeelenberg et al., 2020), as well as Chapter 3, showed that higher dispositional greed was related to a lower satisfaction with life. As discussed, this could be an intrinsic property of greed, due to the constant dissatisfaction of never having enough. Research has shown that having aspirations that cannot be accomplished or reached negatively impact well-being (e.g., Stutzer, 2004). The negative effect on well-being could also be due to the negative consequences that greed has on, for example, their relationships or on their finances. Having good social relationships is crucial to well-being (e.g., Amati et al., 2018; Haller & Hadler, 2006), and, as suggested by Chapter 3 and 6, it seems that being greedy does not help one to have a stable social network. Financial problems can also have a negative impact on well-being (Brown et al., 2005). Future research should further investigate the relationship between greed and well-being, in order to prevent the development of mental disorders, such as depression.

As mentioned, there might be a fine line between good and bad greed. Future research could focus on designing potential interventions to discourage greedy individuals from behaving greedily in circumstances in which their behavior is harmful for themselves or society, and to stimulate greedy behavior when this is actually desirable. One such interventions could be mindfulness. The insatiable desire for more and the constant dissatisfaction of never having enough, suggests that greedy individuals generally do not 'live in the present moment', as they are continuously looking forward in order to acquire more. Mindfulness, rooted in Buddhism, on the other hand, can be defined as "the state of being attentive to and aware of what is taking place in the present" (Brown & Ryan, 2003, p. 822). Walach et al. (2006, p. 41) argued that "mindfulness [can n]ever co-arise with . . . any of the mental states rooted in greed", suggesting that greed and mindfulness cannot go hand in hand (Aspy & Proeve, 2017; Cullen, 2011; Walach et al., 2006). Interestingly, on Wall Street, more and more "greedy" bankers embrace mindfulness (Agnew, 2014). In an initial study, which is not part of this dissertation, I indeed found that dispositional greed and dispositional mindfulness (measured with the trait Mindful Attention Awareness Scale (MAAS); Brown & Ryan, 2003) are negatively correlated. Future research should investigate whether being in a mindful state could temper dispositional greed.

Throughout this dissertation, I made use of the DGS (Seuntjens, Zeelenberg, Van de Ven, et al., 2015) and hence, relied on a self-report measure of greed. As mentioned, greed has a very negative connotation and people do not aspire to be labelled greedy (e.g., Gilliland & Anderson, 2011). As results, respondents might give socially desirable answers. Seuntjens, Zeelenberg, Van de Ven, et al. examined whether dispositional greed related to the tendency to give socially desirable

answers and concluded that “social desirability explains about 6% of the variance in the DGS”. Greed can also be measured in terms of greedy behavior. Razen and Stefan (2019), for example, proposed a modified version of the classic dictator game, the Greed Game. The maximum payoff in this game is capped, creating a clear-cut point of material satiation, so that accumulation beyond this point shows an excessive desire for more than is needed. In their game, they can distinguish greed from similar types of behavior. The problem with defining and measuring greed in terms of behavior, however, is that the inference that such behavior is due to the motive of greed is only one of many that could be made. Different motives could drive this type of behavior. For trading behavior, for example, an obvious alternative explanation to a motive of greed would be risk preferences.

Throughout the empirical chapters, I made use of correlational and cross-sectional data. Still, I believe that this research provides insights into the factors that may affect the strength of greed and opens up avenues for intervention. Ideally, a future, longitudinal study should investigate the underlying mechanism of differences in greed in, for example, socioeconomic success over the years. The results for income in Chapter 3 already suggested that there are differences over the years.

Conclusion

Based on the empirical chapters in this dissertation, I want to highlight the following conclusions and implications. In sum, I found that growing up wealthy is related to higher levels of adult greed (Chapter 2), greed is related to more economic success, sometimes more and sometimes less evolutionary success, and less psychological success (Chapter 3), greedy traders do not trade fundamentally different from non-greedy traders (Chapter 4), groups of greedy traders trade closer to the fundamental value (Chapter 5), and greed affects social relationships in several ways (Chapter 6). The general picture that emerges is that dispositional greed develops during childhood and has economic/financial as well as psychological and social consequences, both positive and negative. Greed, the insatiable desire, thus strongly affects everyday life.

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Summary

Greed is the insatiable desire for more (Seuntjens et al., 2015). This desire can be felt for monetary and material possessions, as well as non-material things such as sex, friends, and status. Recent research has led to valuable insights about what greed is, how it operates and what its consequences are. Nevertheless, there is still much about greed that we do not understand, and there are still several important questions that remain unanswered, for example, what are the origins of greed, is it really the cause of financial scandals and crises, and what are its social consequences? This dissertation aims to uncover how greed affects everyday life. More specifically, it aims to understand more of the psychological mechanisms underlying greed and the financial, economic, and social consequences that greed has.

This dissertation is divided into three sections. The first section, “Becoming and Staying Greedy”, aims at getting a better understanding on how greed comes about and what it is good for. Research has shown that many psychological characteristics that are acquired during adolescence, are typically maintained in adulthood (Eccles et al., 2013). It turns out that a key predictor of several adult personality traits is how poor or wealthy people grew up (Griskevicius, Delton, et al., 2011). Chapter 2 looks at whether people that grew up in relative scarcity (the “scarcity hypothesis”) or relative luxury (“the luxury hypothesis”) tend to be greedier later in life. It is a replication of Liu, Sun, and Tsydypov (2019) in two other cultural contexts (The Netherlands and the USA) with large samples. The findings by Liu et al. were mostly replicated with support for the “luxury hypothesis”. A returning question in the literature on greed, in both the philosophical, religious and empirical publications, is whether greed is good or bad (see, for example, Oka & Kuijt, 2014). Chapter 3 examines whether greed leads to economic, evolutionary and/or psychological success, and as a secondary goal compares greed to self-interest. The study shows that greedy individuals have more economic success, sometimes more and sometimes less evolutionary success, and less psychological success, than their less greedy counterparts. Greed differed from self-interest in terms of economic success, and partly in terms of evolutionary success. They are similar in terms of psychological success.

In the second section, “The Greedy Trader”, I investigate in two chapters whether and how greed affects trading behavior. Greedy bankers and investors have become the culprits of the financial crisis, but empirical evidence for a contribution of greed to trading behavior was long lacking. Chapter 4 looks at individual trading behavior in experimental assets markets. Interestingly, I find no support for the idea that greedier investors trade assets fundamentally different from their less greedy counterparts. Birds of a greedy feather flock together, meaning that greedy individuals tend to be overrepresented in the financial sector. Chapter 5 divides people into markets populated by greedy and by non-greedy traders and compares their behavior. The findings suggest that greed might not contribute negatively to the emergence of financial crises. If anything, markets with greedy

traders might even trade closer to true asset values (i.e., the fundamentals) than markets with non-greedy traders. Even though, these findings cannot be directly generalized to the behavior of (investment) bankers in the financial crisis, the question does arise whether the public opinion was too quick in playing the blame game.

Finally, in the third section, "The Greedy Friend", I consider the social consequences of greed. More specifically, Chapter 6 investigates how greed is associated with various quantitative and qualitative aspects of social relationships, using both primary and secondary survey data. Based on the results of individual studies as well as a meta-analysis on results across studies, I conclude that greed significantly influences greedy people's social lives, as they, for example, experience more feelings of loneliness, have shorter relationships, and objectify their friends more.

In sum, this dissertation found that growing up wealthy is related to higher levels of adult greed (Chapter 2), greed is related to more economic success, sometimes more and sometimes less evolutionary success, and less psychological success (Chapter 3), greedy traders do not trade fundamentally different from non-greedy traders (Chapter 4), groups of greedy traders trade closer to the fundamental value (Chapter 5), and greed affects social relationships in several ways (Chapter 6). The general picture that emerges is that dispositional greed develops during childhood and has economic/financial as well as psychological and social consequences, both positive and negative. Greed, the insatiable desire, thus strongly affects everyday life.

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