Received: 9 April 2020 | Revised: 16 June 2021 | Accepted: 16 June 2021

DOI: 10.1002/bdm.2259

RESEARCH ARTICLE

WILEY

The effects of trait social anxiety on affective and behavioral reactions to others' resource allocations

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Abstract

Most studies investigating interindividual differences in the context of social decision making have focused on the decision maker. Considerably less empirical attention has been paid to interindividual differences in how recipients react both affectively and behaviorally. In two preregistered studies (total $N = 667$), we examined whether heightened levels of trait social anxiety are associated with higher levels of forecasted and experienced negative affective reactions in response to uneven resource allocations by an interaction partner in a dictator game and an ultimatum game as well as corresponding hypothetical and actual behavioral reactions. In accordance with our predictions, social anxiety levels correlated with negative affective reactions; these correlations were stronger the more unevenly the resources were allocated by the other individual. The observed effects remained robust when controlling for expectations and basic personality traits and across two different economic social decision-making tasks. This suggests that social anxiety level is an important contributor to interpersonal differences in affective reactions to another individual's uneven resource allocations.

KEYWORDS
dictator game, interpersonal interaction, negative affect, social anxiety, ultimatum game

1 | INTRODUCTION

Situations involving fairness and cooperation are among the strongest social situations that exist, as evident from the unexpectedly strong social emotions (see Dawes et al., 1977, for compelling illustrations of this) and, in turn, behavioral responses, they elicit. For instance, it was shown that when an individual gets the opportunity to allocate resources between themselves and others and decides to allocate them unevenly, favoring themselves, this can trigger negative affective reactions such as anger and disappointment in the (non-)recipient, which may, in turn, impede future social interaction (e.g., Barclay et al., 2005; Dunn & Schweitzer, 2005; Martinez et al., 2011).

Considerably less empirical attention has been paid to interindividual differences in how recipients affectively react to receiving more or less even allocations of resources by another individual and to what degree these differences translate to behavior. On a trait level, individuals are generally known to differ in their overall affective excitability, referred to as emotionality in the HEXACO personality framework (Ashton & Lee, 2007) and neuroticism in the five-factor model (McCrae & Costa, 1987). They furthermore differ in their affective excitability specific to social contexts, as is the case for social anxiety (Ruscio, 2010). However, little is currently known about how trait differences impact affective reactions to receiving more or less uneven resource allocations by others and, in turn, behavioral

responses. Because research has demonstrated that affective excitability in social contexts is altered in socially anxious individuals (e.g., Beidel et al., 1985; Gramer et al., 2012; Morris et al., 1981) and because perceived unfairness as a result of uneven resource allocations is such a powerful trigger of negative affect even in less affectively excitable individuals (Dawes et al., 1977), we predict that high trait social anxiety levels may predispose individuals to increased negative affective reactions to uneven resource allocations favoring the allocator and, in turn, alter behavioral responses.

Social anxiety is generally characterized by anxiety in and avoidance of social situations (Kasper, 1998) and best understood as a dimensional construct ranging from negligibly low levels to clinical levels (Ruscio, 2010). Importantly, interpersonal dysfunction is considered to be a core feature of social anxiety disorder, that is, of clinical social anxiety (Alden & Taylor, 2010), but pronounced social anxiety impairs interpersonal relationships even at subclinically increased trait levels (see Alden & Taylor, 2004, for a review). For instance, socially anxious individuals are less likely to be married (Schneier et al., 1992), report less satisfying friendships (Rodebaugh, 2009), and are at a higher risk for not having any close friends at all (Davidson et al., 1994). Because intimate and supportive interpersonal relationships have a powerful impact on emotional well-being, physical health, and even longevity (Helliwell & Putnam, 2004; Holt-Lunstad et al., 2015; House et al., 1988; Steptoe et al., 2013), it is important to understand how socially anxious individuals differ in their (reactions to) social interactions from non-anxious individuals and why these differences exist.

Overall, individuals with clinical levels of social anxiety are more likely to perceive ambiguous social scenarios as negative and to catastrophize mildly negative social scenarios both compared to equally anxious individuals with another anxiety disorder and healthy controls (Stopa & Clark, 2000). Furthermore, individuals high in social anxiety rate ambiguous videos as more negative than less socially anxious individuals (Amir et al., 2005).

The most widely adopted way to study resource allocation between individuals in a standardized, controlled way is to use economic social decision-making tasks, such as the dictator game, the ultimatum game, the trust game, or the prisoner's dilemma (for recent reviews, see van Dijk & de Dreu, 2021; Murnighan & Wang, 2016). In these paradigms, participants are asked to allocate their own resources, typically money, between themselves and one or several other participants. Because these paradigms allow quantifying differences in interpersonal preferences due to their systematic payoff structure and standardization, they have been increasingly used to study the psychological foundations of interindividual variations in social decision making (for a meta-analysis, see Thielmann et al., 2020), including psychopathologies (for a review, see King-Casas & Chiu, 2012). Evidence addressing effects of social anxiety on behavior in economic social decision-making tasks currently appears equivocal but overall supports the prediction that socially anxious individuals do not differ in their general generosity but in their responsiveness (neural and behavioral) to others' resource allocations (e.g., Anderl et al., 2018; Rodebaugh et al., 2011, 2016, 2017; Sripada et al., 2009, 2013), even though research has not specifically focused on *affective* responsiveness in the context of social anxiety and resource allocations yet.

1.1 | The present research

In the present research, we set out to investigate whether more socially anxious individuals indeed show more negative affective reactions in response to others' uneven resource allocations and, in turn, altered behavioral responses as expected based on our theorizing. To this end, we recruited participants online and assessed their affective and subsequent behavioral responses in the recipient roles of a dictator game (Studies 1 and 2) and an ultimatum game (Study 2) in addition to their trait social anxiety levels across two studies. In a standard dictator game, two individuals (the "allocator" and the "recipient") are randomly and typically anonymously matched. The allocator receives an initial financial endowment from the experimenters and gets the chance to allocate any amount (between 0 and the total endowment) to the recipient. Both the allocator and the recipient then receive their respective earnings (allocator: initial endowment minus allocated amount; recipient: allocated amount). The structure of the ultimatum game is almost identical to the dictator game, with one important exception: while both the allocator and the recipient always receive their respective earnings as determined by the allocator's split in the dictator game, in the ultimatum game, the recipient gets the opportunity to decline the allocator's split in which case neither of the players would receive any earnings. We specifically selected the dictator game and the ultimatum game for our studies because of their pronounced structural similarity, which makes them easily comparable across studies while differing considerably in their situational affordances: while the allocator can keep the entire endowment without fear of retaliation in the dictator game, leaving the determination of the outcome entirely in the hand of the allocator, allocator and recipient depend on each other's choices to jointly determine the outcome in the ultimatum game. This renders the latter interaction more strategic (Thielmann et al., 2020). As a result, allocations are on average higher in the ultimatum game than in the dictator game (for a review, see Murnighan & Wang, 2016), and compared to other commonly used social economic decision-making tasks, prosocial traits have been shown to predict allocator behavior in the dictator game best while they predict allocator behavior the least well in the ultimatum game (Thielmann et al., 2020). In consequence, combining dictator and ultimatum games will allow us to test the generalizability of the expected effects.

Research shows that when the allocator transfers about 50% of the initial endowment in the ultimatum game, that is, allocates the resources approximately evenly, the recipient typically responds with positive affect and almost always accepts the allocation when given the possibility to accept or reject it. In contrast, very uneven allocations of ≤10% predominantly elicit negative affect in the recipient, combined with a high likelihood of rejecting the allocation. Finally, moderately uneven allocations of around 20–30% are on average

neither considered positive nor negative and rejected by about 50% of participants (Civai et al., 2010). This suggests that a 50% allocation can generally be considered a positive event for the recipient, a 0% allocation a negative event, and an allocation of around 25% an ambiguous event that can be interpreted either positively or negatively by different people. Because highly socially anxious individuals are more prone to perceiving ambiguous social situations as negative and to catastrophizing mildly negative social events (Amir et al., 2005; Stopa & Clark, 2000), we hypothesized that higher levels of social anxiety would overall predict more negative affective responses to more negative social situations in the recipient role of an anonymous dictator game and an ultimatum game. We additionally expected that these effects would translate to behavioral reactions in a way that highly socially anxious individuals would, themselves, show a lower propensity to interact and to allocate resources with an individual who had allocated less themselves and a higher propensity to reject relatively uneven allocations in the ultimatum game. Because we are interested in negative affective reactions, the present research will focus on uneven allocations only when they favor the allocator.

In Study 1, we assessed forecasted and experienced affective reactions to varying levels of received allocations in the dictator game and interpersonal behavioral tendencies after the interaction in a hypothetical decision scenario and related them to trait social anxiety levels while controlling for two personality traits, the fairness facet of the HEXACO factor Honesty-Humility (HEXACO-HH Fairness) and the HEXACO emotionality factor (HEXACO-E), that have been theoretically linked to resource allocation behavior/preferences and anxiety, respectively (Ashton et al., 2014; Ashton & Lee, 2007; Hilbig et al., 2014). We moreover assessed recipients' expectations, that is, the allocation they expected most likely to get from the allocator. Controlling for the effect of expectations as a robustness test is important in the present research context because expectations are an important determinant of some discrete emotional experiences, including disappointment (de Cremer, 2006; van Dijk & Zeelenberg, 2002) and because socially anxious individuals overall expect negative social events to be more likely to happen to them (Foa et al., 1996). However, it should be kept in mind that expectations generally seem to be less important in the context of other person-related affective experiences such as in the present research (van Dijk & Zeelenberg, 2002). In Study 2, we used the same general methods but extended and improved the design. In particular, we used an improved affect scale, assessed social anxiety separately from the other study measures to avoid potential spillover effects, used an ultimatum game in addition to a dictator game to assess the effect in a different type of social interaction and different allocation levels to test the generalizability of the results, and assessed behavioral reactions with behavioral measures instead of hypothetical ones.

Both Studies 1 and 2 were preregistered (Study 1, Session 1: osf.io/nmys7; Session 2: osf.io/b7wv9; Study 2: osf.io/uv4st)[1]; study materials, predata reports, raw data, analysis scripts, and online supplemental materials are available at osf.io/da5rk (Study 1) and osf.io/f9tp3 (Study 2 and Supporting Information).[2] Most previous studies investigated the relationship between social anxiety and affectivity in hypothetical contexts (e.g., Amir et al., 2005; Stopa & Clark, 2000), limiting ecological validity, or in daily life (e.g., Kashdan & Steger, 2006), restraining experimental control. In contrast, the present research was designed to specifically assess affective reactions—both forecasted and experienced—and behavioral reactions in response to other people's interpersonal behavior in an ecologically valid, but more controlled setting.

2 | STUDY 1

In Study 1, we intended to test whether trait social anxiety predicts affective reactions—both forecasted and experienced—to more uneven resource allocations by others as hypothesized. In addition, we aimed at providing initial evidence that trait social anxiety predicts corresponding (hypothetical) behavioral reactions, in particular the willingness to interact again with the same individual. Because social anxiety is characterized by generalized avoidance of social situations and not just avoidance of social interactions in specific situations, finally, we were interested in whether this behavioral tendency would generalize to other individuals (that is, individuals beyond the interaction partner) as well. As a most direct test of responses to different levels of others' willingness to allocate resources evenly (rather than potentially strategic moves by others), we used the dictator game in Study 1. Based on our theorizing, we hypothesized that individuals with higher levels of social anxiety would forecast (hypothesis H1a) and experience (hypothesis H1b) stronger negative affective reactions in response to more uneven allocation (interaction: Social anxiety $\times$ Received allocation on outcome variables: forecasted and experienced negative affective reactions). Furthermore, we expected this altered affective response to more uneven allocations in individuals with higher social anxiety to translate to intentions for future interactions. In particular, we hypothesized that individuals with higher levels of social anxiety would show a decreased willingness to engage in another interaction with the same (H2) and another person (H3) in response to more uneven allocations (interaction: Social anxiety $\times$ Received allocation on outcome variables: willingness to engage in another interaction with the same and another person, respectively).

2.1 | Participants and design

A total of $N = 248$ (female: $n = 157$, male: $n = 89$, other: $n = 2$; age in years: $M = 35$, $SD = 12.23$) participants were recruited for the recipient role in a dictator game from the online *DecisionLab* of the *FernUniversität Hagen* (Germany) for the study using the online recruitment system ORSEE (Greiner, 2004). To avoid deception, we tested an additional $N = 252$ participants who took over the allocator role in the dictator game. The data of these participants were not analyzed for the present study, in accordance with our preregistered plan

(osf.io/da5rk). Assignment to player role was randomized. In accordance with the recommendations by Schönbrodt and Perugini (2013) regarding sample sizes for correlational analyses, we had aimed to recruit $N = 250$ participants per group for Session 1 of the study. Deviation from the aimed $N = 250$ per group resulted from a slightly uneven randomization through the online survey program (*Unipark*). According to G*Power (Faul et al., 2009), a sample size of $N = 248$ corresponds to a test power of ≥.99 to detect the smallest of the hypothesized bivariate correlations (a correlation of $r = .31$ between social anxiety and anticipated negative affect in response to a transfer of 25/100 points) based on the effect sizes obtained in a pilot study (see Supporting Information at osf.io/f9tp3) for a one-sided test ($\alpha = .05$). The study consisted of two main sessions; 1 week after Session 1, we reinvited all recipient participants to complete Session 2 of the study, resulting in a slightly lower $N = 228$ for this session due to dropouts. The test power to detect an effect size of $r = .31$ in a one-sided test ($\alpha = .05$) remained at 1 – beta ≥ .99. Participants received a total of 3 Euros (approximately US$3.50) for participating in both Sessions 1 and 2 plus their individual earnings from the dictator game (between 0 and 2 Euros).

2.2 | Materials and procedure

A schematic depiction of study procedures and materials can be found in Figure 1. Basic personality scores were available for all participants prior to study participation. In particular, all participants had completed a base-assessment battery lasting about 1 h when signing up for the *DecisionLab* initially (several weeks to months prior to study participation). This battery included the German 104-item HEXACO Personality Inventory-Revisited (HEXACO-PI-R, Lee & Ashton, 2006) version. Each item of the 104-item survey is scored on a 5-point Likert scale (from 1 = *strongly disagree* to 5 = *strongly agree*) and can be assigned to one of six domain-level scales (Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to Experience) and one facet-level scale within its respective domain-level scale. In the present study, we focused on the Fairness facet[2] of the Honesty-Humility scale (HEXACO-HH Fairness; Cronbach's $\alpha = .78$), assessing a person's tendency to avoid fraud and corruption, and the Emotionality domain-level scale (HEXACO-E; Cronbach's $\alpha = .80$), assessing a general tendency to experience emotions intensely, including fear of physical dangers, anxiety in response

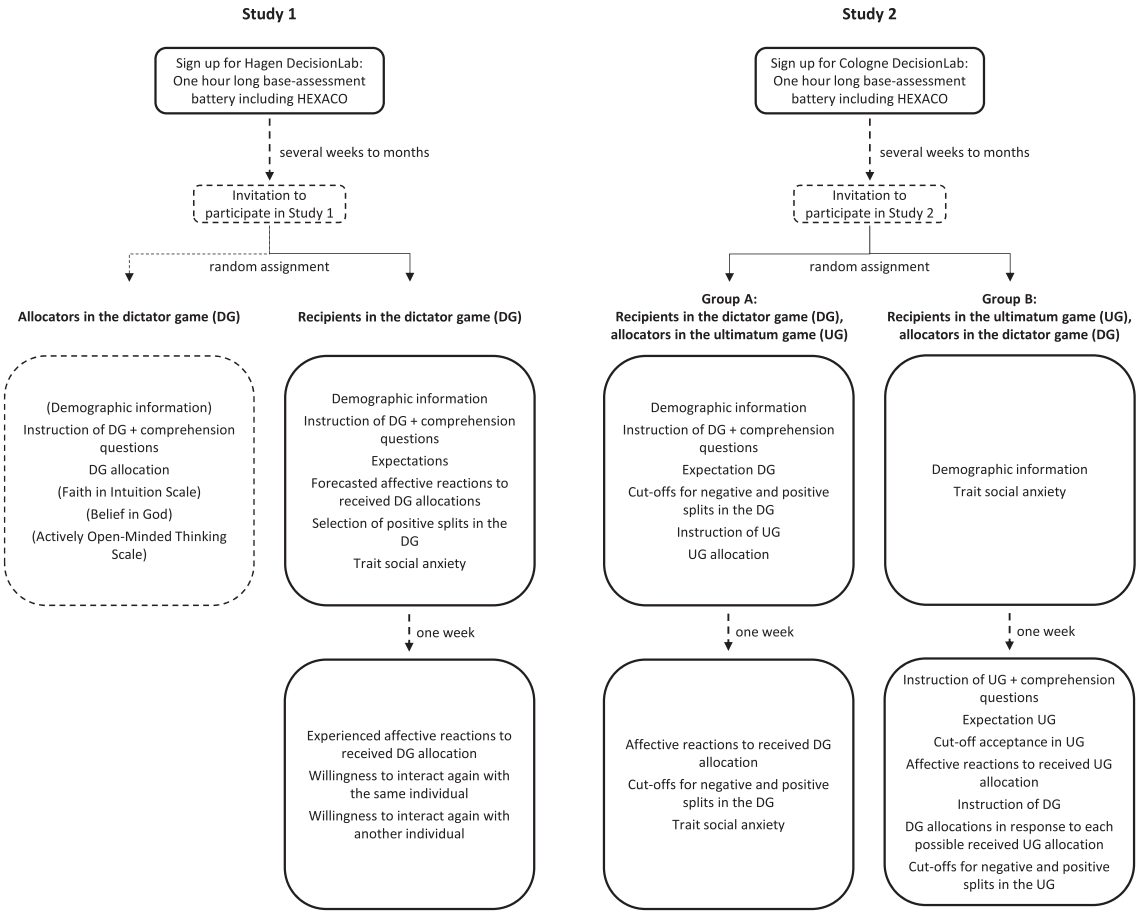

FIGURE 1 Schematic depiction of study procedures and materials for Studies 1 (left) and 2 (right). Abbreviations: DG: dictator game; UG: ultimatum game. Measures depicted in solid boxes were relevant for the respective preregistered study plan. Measures in brackets are unrelated to the present research questions

to life's stresses, a need for emotional support from others, and empathy and sentimental attachments with others. The decision to analyze these two HEXACO scales, which are theoretically closely linked to resource allocation behavior/preferences (HEXACO-HH Fairness) and anxiety (HEXACO-E; Ashton et al., 2014), and not to use any other data from the base-assessment besides basic demographic information for this study was made prior to data collection of Session 1 and preregistered (see osf.io/da5rk).

In Session 1 of the actual study, participants in the recipient role were asked to read the instructions to the dictator game and then completed the following measures in the presented order: to ensure that all participants fully understood the rules of the dictator game, they were asked two comprehension questions upon reading its instructions. If they failed to answer one of these questions correctly in a maximum of two trials each, they were screened out prior to completion of the questionnaire. To assess interindividual differences in expectations as a potential influence factor, participants were then asked to estimate which amount of points the other person would allocate to them in the dictator game. To assess forecasted affective reactions to different received amounts (outcome variable), participants were subsequently asked to report how they expected to feel in case their interaction partner would allocate 0, 25, and 50 out of 100 points to them (presented in randomized order and on different pages). To quantify affect, a Likert scale ranging from 0 to 5 (from 0 = *not at all* to 5 = *very strongly*) was used for each of the following affect descriptions: grateful, happy, disappointed, and angry (presented in randomized order). Participants were informed that points would be transferred into Euros at a rate of 1 point = 2 Euro cents at the end of the study. The mean score of negative affect items (disappointed and angry) was used to determine negative affect per received amount (itemized results are available in Table S1 of osf.io/f9tp3). Internal consistencies for these measures were high (all Cronbach's αs > .82). To check the assumption that maximally uneven (i.e., zero) allocations were indeed perceived as negative (nonpositive) and entirely even (i.e., 50%) allocations as positive by most people, and moderately uneven allocations of 25% as positive by about half of the people, participants were then asked to select the point allocations between themselves and the allocator that they would consider positive. Finally, to assess individual levels of social anxiety, all participants completed the 17-item Social Phobia Inventory (SPIN; Connor et al., 2000; German version: Stangier & Steffens, 2002). Each item is scored on a 5-point Likert scale (from 0 = *not at all* to 4 = *extremely*), providing a total sum score between 0 and 68; the internal consistency of this measure was Cronbach's $\alpha = .92$.

In Session 2, we aimed to measure experienced in contrast to forecasted affect. Therefore, participants were informed about the actual amount their anonymous partner had allocated to them and indicated their affective reactions in response to this received amount. Experiences differed between participants dependent on the behavior of the allocators in the dictator game, resulting in a broad distribution (see Table 1). To quantify the affect in response to their partner's allocation, again a Likert scale ranging from 0 to 5 (from 0 = *not at all* to 5 = *very strongly*) was used for each of the following affect descriptions: grateful, happy, disappointed, and angry (presented in randomized order). As for forecasted affect, the mean score of negative affect items (disappointed and angry) was used to determine experienced negative affect (itemized results are available in Table S1 of osf.io/f9tp3). Internal consistencies for this measure were high (Cronbach's $\alpha = .87$). Finally, we included a hypothetical behavioral measure to investigate whether the negative affect experienced in response to the received allocation translated to disrupted interpersonal behavior as expected. More specifically, participants were asked

TABLE 1 Descriptive statistics and correlations between social anxiety and negative affect in response to different received allocation levels for forecasted (left) and experienced affect (right) and bivariate correlations between forecasted and experienced negative affect in Study 1

	Forecasted affect				Experienced affect				
	M (*SD*)	*N*	Bivariate correlation with SPIN	Partial correlation with SPIN controlling for expectations	*M* (*SD*)	*N*	Bivariate correlation with SPIN	Partial correlation with SPIN controlling for expectations	Bivariate correlation with forecasted affect
Negative affect: 0% allocation	2.46 (1.69)	248	.21**	.23***	2.22 (1.64)	48	.38**	.41**	.64**
Negative affect: 25% allocation	1.67 (1.36)	248	.19**	.22***	2.02 (1.33)	23	.25	.24	.45*
Negative affect: 50% allocation	0.54 (0.89)	248	−.03	−.02	0.32 (0.71)	147	−.02	−.004	.59**

*$p < .05$.
**$p < .01$.
***$p < .001$ (two-tailed, not corrected).

how likely they were to decide to engage in another interaction with (i) the same and (ii) another person in a similar task if given the opportunity (*certainly not* [0%] to *certainly yes* [100%]).

2.3 | Statistical analyses

For all data analyses, we specified a Type I error of $\alpha = .05$. When Mauchly's tests indicated that the assumption of sphericity was violated ($p < .05$), Greenhouse–Geisser corrected values were used. To test the robustness of our findings, all analyses were repeated entering HEXACO-HH Fairness, HEXACO-E, and expectations as control variables. For all analyses including data from Session 2, we additionally included these variables' two-way interactions with actually received amount as control variables into the analyses. Leverage indices were used to determine multivariate statistical outliers; a leverage index of at least four times the mean leverage was classified as a statistical outlier (Tabachnick et al., 2001).

3 | RESULTS AND DISCUSSION

When randomly matching allocators and recipients into 1:1 pairs, 48 of the recipients who participated in both test sessions ended up being assigned to an allocator who had allocated 0 points, 23 to an allocator who had allocated 25 points, 147 to an allocator who had allocated 50 points, and five each to an allocator who had allocated 75 and 100 points, respectively.

Overall, 4% of our participants perceived a received amount of 0/100 points as positive, 45% perceived a received amount of 25/100 points as positive, and 98% perceived a received amount of 50/100 points as positive. In accordance with our assumptions, this suggests that a 50% allocation can generally be considered a positive event, a 0% allocation a nonpositive event, and an allocation of around 25% an ambiguous event that can be interpreted either positively or not by different people. Notably, social anxiety levels did not show a substantial relationship with expectations or assessment of as how positive each of these different allocations was perceived (all $rs < |.14|$).

Trait social anxiety levels (SPIN score) and the core dependent measures (negative affect, willingness to interact again) varied considerably (see Tables 1 and 2). Furthermore, a substantial number of the participants in this sample ($n = 74$; 30%) obtained total SPIN scores of 25 or higher, suggesting that a substantial number of our participants likely met the criteria for social anxiety disorder (Sosic et al., 2008). Variation of forecasted negative affect was strongest for 0 allocations and 25% allocations but limited for 50% allocations, likely indicating a floor effect (see Figure 2). Forecasted and experienced negative affect were highly correlated within each allocation amount (see Table 1).

To test our hypothesis H1a that individuals with higher social anxiety forecast stronger negative affective reactions to more uneven allocation, we conducted generalized linear models (GLMs) in which we entered the total SPIN score (between-subject: continuous), the received amount (within-subject: 0%, 25%, 50%), and the interaction between SPIN score and received amount as predictors and the mean score of negative affect items (angry and disappointed) as outcome variable. In line with our prediction, the interaction effect between SPIN score and received amount on forecasted negative affective reactions was significant, $F(1.66, 407.59) = 10.50$, $p < .001$, $\eta_p^2 = .04$, with positive bivariate relationships between social anxiety with negative affective reactions in response to very uneven, $r(247) = .21$, $p = .001$, and moderately uneven, $r(247) = .19$, $p = .003$, but not even allocation levels, $r(247) = -.03$, $p = .63$. We also found significant main effects of social anxiety, $F(1.66, 407.59) = 31.01$, $p < .001$, $\eta_p^2 = .11$, and received allocation, $F(1, 246) = 7.82$, $p = .006$, $\eta_p^2 = .03$, on forecasted negative affect. Two data points were identified as multivariate outliers; removing these data points from analyses did not alter the core results.

To test our hypothesis H1b that individuals with high social anxiety also show stronger experienced negative affective reactions to

TABLE 2 Descriptive statistics for willingness to interact again in response to different received allocation levels and correlations with social anxiety in Study 1

	M (*SD*)	*N*	Bivariate correlation with SPIN	Partial correlation with SPIN controlling for expectations
Willingness to interact again after 0% allocation				
With same person	23.35 (27.88)	48	−.23	−.23
With another person	67.83 (26.90)	48	.10	.10
Willingness to interact again after 25% allocation				
With same person	40.65 (26.45)	23	.03	.03
With another person	69.13 (22.84)	23	.16	.18
Willingness to interact again after 50% allocation				
With same person	82.71 (18.55)	147	.09	.09
With another person	59.78 (26.62)	147	−.05	−.02

*$p < .05$.
**$p < .01$.
***$p < .001$ (two-tailed, not corrected).

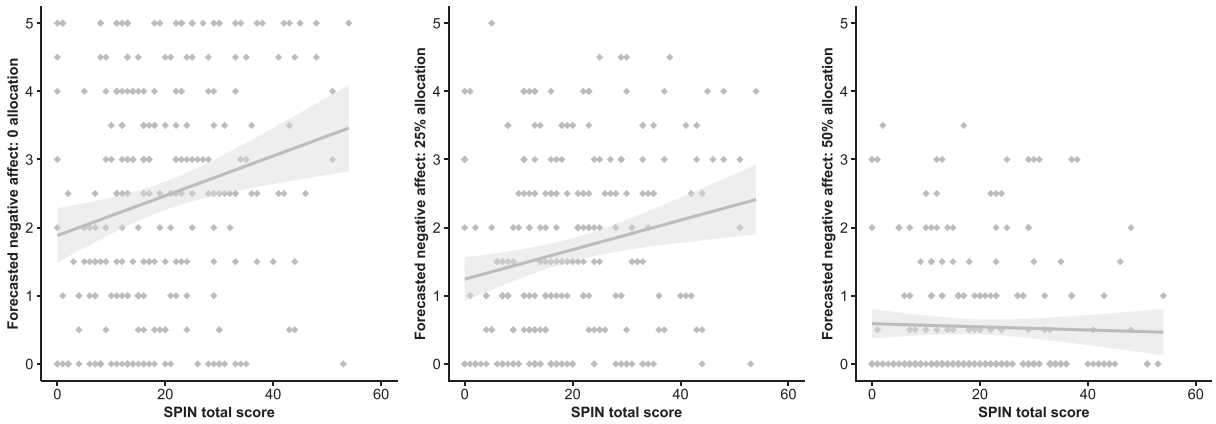

FIGURE 2 Scatter plots depicting the relationship between SPIN total score (*x* axis) and forecasted negative (*y* axis) affect ratings for 0 (left), 25% (middle), and 50% (right) allocation levels in Study 1

more uneven allocation, we conducted a second GLM in which we entered the total SPIN score (between-subject: continuous), the actual received amount participants received from their partner (between-subject: 0, 25, 50[3]), and the interaction between SPIN score and received amount as predictors and the mean score of negative affect items (angry and disappointed) as outcome variable. This analysis revealed a significant interaction effect, $F(1, 214) = 13.66$, $p < .001$, $\eta^2 = .06$. Correlations between social anxiety and negative affect reduced with increasing allocation (see Table 1). This again confirms our predictions, although it has to be acknowledged that sample sizes are very small for experiences of higher allocation values. In addition, we found significant main effects of social anxiety, $F(1, 214) = 21.43$, $p < .001$, $\eta_p{}^2 = .09$, and received allocation, $F(1, 214) = 9.83$, $p = .002$, $\eta_p{}^2 = .04$, on experienced negative affect. Four data points were identified as multivariate outliers; removing these data points from analyses did not alter the key results. All reported effects for both forecasted and experienced negative affective reactions remained robust when the following control variables were added to the analyses: HEXACO-HH Fairness, HEXACO-E, expectations,[4] as well as their two-way interactions with actual received amount (the latter for Session 2 data only).

To test our hypotheses that individuals with high social anxiety would show a decreased willingness to engage in another interaction with the same person in response to more uneven allocation (H2) and that individuals with high social anxiety would show a decreased willingness to engage in another interaction also with another person in response to more uneven allocation (H3), we conducted two separate GLMs in which we entered the total SPIN score (between-subject: continuous), the actually received amount (between-subject: 0, 25, 50), and the interaction between SPIN score and received amount as predictors and the willingness to engage in another interaction in a similar task with the same or another person, respectively, as outcome variable. In support of hypothesis H2, our analyses revealed a significant interaction between SPIN and real allocation level on the willingness to interact again with the same partner, $F(1, 214) = 4.81$, $\eta^2 = .02$, $p = .029$, even though none of the individual correlations between SPIN and willingness to interact again with the same partner per allocation level reached the conventional level of significance (see Table 2). Notably, this interaction effect disappeared, $F(1, 208) = 1.23$, $\eta^2 < .01$, $p = .27$, when HEXACO-HH Fairness, HEXACO-E, expectations, and their two-way interactions with received amount were entered as control variables into the analyses to test the specificity of the interaction effect. HEXACO-E showed both a significant main effect, $F(1, 208) = 6.99$; $\eta^2 = .03$; $p = .009$, and, together with the actually received amount, a significant interaction effect, $F(1, 208) = 5.08$, $\eta^2 = .02$, $p = .025$, in predicting the willingness to interact again with the same partner. Further exploratory analyses revealed that the interaction between SPIN and real allocation also disappeared when controlling for experienced negative affect and its two-way interaction with received amount, $F(1, 212) = 0.67$, $\eta^2 < .01$, $p = .41$. Experienced negative affect, $F(1, 212) = 20.43$, $\eta^2 = .09$, $p < .001$, and received amount, $F(1, 212) = 46.43$, $\eta^2 = .18$, $p < .001$, both showed a significant main effect in predicting the willingness to interact again with the same partner. Taken together, this indicates that the observed increased avoidance behavior for the same persons of high SPIN individuals may indeed be driven by negative affective components related to emotional stability rather than being a specific effect of social anxiety.

In contrast, our prediction H3 that individuals with high social anxiety would show a decreased willingness to engage in another interaction with another person in response to more uneven allocation (interaction: SPIN score × Actual allocation on outcome variable: willingness to engage in another interaction with another person) was not supported by our data, $F(1, 214) < 1$, $\eta^2 < .01$, $p = .34$. Neither SPIN score, $F(1, 214) < 1$, $\eta^2 < .01$, $p = .33$, nor actual allocation, $F(1, 214) < 1$, $\eta^2 < .01$, $p = .80$, were significant predictors of the willingness to engage in an interaction with another person.

Results of Study 1 provide support for the expected positive association between social anxiety and negative affect for more uneven allocations. Individuals with higher social anxiety forecasted and experienced stronger negative affective reactions to more uneven allocation of others. Similarly, there was preliminary support for the

expected association between social anxiety and a lower willingness to interact again with the same individual in response to more uneven allocation.

However, there are several caveats. First, negative affect was not assessed with a validated affect measure but an aggregate of two self-constructed affect items. Second, trait social anxiety was assessed in the same session as forecasted affect, which could have resulted in spillover effects. Third, affective reactions were only tested in a dictator game setting, and fourth, effects were tested with three allocation amounts only, keeping unresolved whether the findings would generalize to other social contexts. Fifth, the behavioral measures were hypothetical, thereby not allowing us to draw strong conclusions about real behavioral responses.

Study 2 set out to address these limitations by (1) using the Positive and Negative Affect Schedule (PANAS) as a well-validated affect scale, (2) assessing social anxiety separately from the other study measures to avoid potential spillover effects, (3) using an ultimatum game in addition to a dictator game as a different type of social interaction and (4) different allocation levels to test the generalizability of the results, and (5) assessing behavioral reactions with behavioral measures instead of hypothetical ones. In particular, we measured two distinct behavioral responses: (a) recipients' minimal acceptable received allocation in the ultimatum game as a direct behavioral response to more or less uneven ultimatum game allocations and (b) their own allocations to the same interaction partner in a subsequent dictator game depending on the received allocation in the ultimatum game. While costly punishment by rejecting low allocations is known to be a common response to the negative affect uneven allocations can trigger from previous research (e.g., Seip et al., 2014), we also aimed to go beyond this and additionally test whether a potential effect would carry over to another interaction—a dictator game in the allocator role with the same interaction partner. We considered this plausible because reciprocal/retaliatory behavioral reactions to uneven allocations have been shown to persist in prior research (Ben-Ner et al., 2004). Because no (hypothetical) behavioral effect had been found for another interaction partner, we exclusively focused on the same interaction partner in Study 2. Finally, Study 2 was intended to serve as a partial replication of Study 1.

4 | STUDY 2

Building on our theorizing and the results obtained in Study 1, we hypothesized that individuals with high social anxiety forecast stronger negative affective reactions to less even resource allocation (interaction: Social anxiety × Received allocation on dv: negative affect) in a dictator game (hypothesis H1) and an ultimatum game (hypothesis H2). Furthermore, we expected that individuals with high social anxiety have a higher minimal acceptable received allocation in the ultimatum game than individuals lower in social anxiety (hypothesis H3). Finally, we hypothesized that individuals with high social anxiety allocate smaller amounts in a dictator game as reaction to lower received allocations in an ultimatum game (interaction: Social anxiety × Received allocation in ultimatum game on dv: own allocation in dictator game;).

4.1 | Participants and design

Participants with heterogeneous backgrounds were recruited from the Decision Lab Cologne (https://decisionlabcologne.uni-koeln.de/) via the online recruitment tool Hroot (Bock et al., 2014) to take part in the study. To avoid deception, we tested two groups (Groups A and B) with different player roles that were analyzed separately to test the hypotheses. Assignment to groups was randomized. In accordance with the recommendations by Schönbrodt and Perugini (2013) regarding sample sizes for correlational analyses, we recruited $N = 250$ participants per group for Session 1 of the study. According to G*Power (Faul et al., 2009), this sample size corresponds to a test power of ≥.92 to detect the smallest of the hypothesized bivariate correlations (the positive correlation between social anxiety and anticipated negative affect in response to a transfer of 25/100 points) based on the effect sizes obtained in Study 1 for a one-sided test ($\alpha = .05$). The sample size was also selected to assure a power > .80 in case of a maximum expected dropout rate of 30% between T1 and T2. The actual dropout rates were 13% in Group A and 20% in Group B, resulting in effective samples of $N = 218$ (female: $n = 156$, male: $n = 61$, other: $n = 1$; age in years: $M = 29.03$, $SD = 9.45$) and $N = 201$ (female: $n = 152$, male: $n = 48$, other: $n = 1$; age in years: $M = 28.74$, $SD = 10.41$), respectively. Participants received a total of 3 Euros (approximately US$3.50) for participating in both Sessions 1 and 2 plus their individual earnings from the dictator or ultimatum game (between 0 and 2 Euros).

4.2 | Materials and procedure

Like for Study 1, participants of Study 2 had completed several measures including the HEXACO personality measure (relevant to this study) when signing up for the Decision Lab (several weeks to months prior to study participation). The decision about what measures would be relevant was made prior to data collection for the actual study (see preregistration at osf.io/uv4st). A schematic depiction of study procedures, materials, and timeline can be found in Figure 1.

For the actual Study 2, we tested and analyzed data of two different groups, Groups A and B, with different roles in the interactions to address the limitations of Study 1 outlined above. Both groups were tested twice, approximately 1 week apart. For Group A, Session 2 used the same general measures and procedures as Session 1 of Study 1, with a few important extensions. In particular, to quantify forecasted negative affect in response to their partner's allocation in a dictator game, we used the upset subscale of the well-validated and widely used PANAS in its German version (Krohne et al., 1996). For consistency with Study 1, we additionally assessed the following items: grateful, happy, disappointed, and angry (not included in primary analyses but reported in Table S3 of osf.io/f9tp3). The PANAS

subscale upset has been observed to predict decisions in interactive economic games in prior studies (Mischkowski et al., 2018). Results on overall negative affect are reported in Table S2 of osf.io/f9tp3. To test whether the effects observed in Study 1 could be generalized to almost, but not entirely even allocations, participants were asked to report their forecasted affect in response to receiving 0, 25, or 45 (instead of 50) out of 100 points. We specifically changed the high and not the other allocation levels because this one had shown limited variance in negative affective reactions in Study 1. Participants were additionally asked to select the cutoff point for when they would still consider an allocation between themselves and the other person negative/positive when they themselves were on the receiving end (two separate items). Expectations about the received amounts were assessed in Session 1, as was the amount they would like to allocate to their interaction partner in an ultimatum game (possible choices: 10, 20, or 50 points out of 100).

For Group B, only the SPIN was assessed in Session 1, while all other measures were assessed in Session 2 to avoid spillover effects. After introducing participants to the ultimatum game, they were asked two comprehension questions which served as immediate exclusion criteria. They were then asked to decide on a cutoff score (0–100 out of 100) from which amount onward they would accept received allocations in the ultimatum game, followed by estimating the amount the other person would actually allocate to them (expectation). Participants were then asked to report, per possible allocation amount (10, 20, 50; displayed in randomized order), how this would make them feel using the same affect scale as described above (PANAS subscale upset; results on the overall negative affect scale are reported in Table S2 osf.io/f9tp3). We again additionally assessed the following items: grateful, happy, disappointed, and angry (not included in primary analysis but again reported in Table S3 of osf.io/f9tp3). Subsequently, participants were asked to decide which amount (0, 15, 25, 35, 45, or 55 out of 100 points) they would like to allocate to the other person in the dictator game if they were matched with an interaction partner who had offered them 10, 20, and 50 points, respectively, in the ultimatum game (in randomized order). Finally, participants were asked to select the cutoff point for when they would still consider an allocation between themselves and the other person negative/positive while being on the receiving end in the ultimatum game.

5 | RESULTS

On average, participants perceived a received amount of at least $M = 42.8$ ($SD = 11.6$) points as positive and a received amount of $M = 33.3$ ($SD = 15.0$) or less as negative in the dictator game. In the ultimatum game, participants on average perceived a received amount of at least $M = 44.1$ ($SD = 14.3$) points as positive and a received amount of $M = 31.4$ ($SD = 14.5$) or less as negative. These scores did not differ between games ($ts < |1.31|$). Notably, social anxiety levels did not show a substantial relationship with assessment of as how positive or negative each of these different allocations was perceived (all $rs < |.05|$). In contrast, expectations differed significantly between the two social interaction tasks: participants on average expected to receive 32.19 ($SD = 23.76$) points in the dictator game, while they expected to receive 42.67 ($SD = 16.00$) in the ultimatum game, $t(382.6) = 4.8$, $p < .001$. Again, expectations were unrelated to social anxiety levels (both $rs < |.09|$). Like for Study 1, social anxiety levels (SPIN score) and the core dependent measures (negative affect and the two measures of behavioral reactions) varied considerably (see Table 3). While variation of negative affect was limited for 50% allocations in the ultimatum game, it was considerably less so for 45% allocations in the dictator game (see Figure 3). Again, a substantial number of the participants obtained total SPIN scores of 25 or higher (Group A: $n = 62$, 28%; Group B: $n = 77$, 38%), suggesting that a substantial number of our participants likely met the criteria for social anxiety disorder (Sosic et al., 2008).

To test our hypothesis H1 that individuals with higher trait social anxiety forecast stronger negative affective reactions to more uneven allocation in the dictator game, we conducted GLMs in which we entered the total SPIN score (between-subject: continuous), the received amount (within-subject: 0%, 25%, 45%), and the interaction between SPIN score and received amount as predictors and the mean score of negative affect items (PANAS subscale upset) as outcome variable. In line with our prediction and the results obtained in Study 1, the interaction effect between SPIN score and received amount on forecasted negative affective reactions was significant, $F(1.62, 349.41) = 9.22$, $p < .001$, $\eta_p^2 = .04$, with stronger positive bivariate relationships between social anxiety with negative affective reactions in response to zero, $r(217) = .27$, $p < .001$, than moderate, $r(217) = .15$, $p = .002$, and high allocation levels, $r(217) = .16$, $p = .002$. We also found significant main effects of social anxiety, $F(1, 216) = 12.48$, $p = .001$, $\eta_p^2 = .06$, and received amount, $F(1.62, 349.41) = 71.06$, $p < .001$, $\eta_p^2 = .25$, on forecasted negative affect. Three data points were identified as multivariate outliers; removing these data points from analyses did not alter the core results. These effects remained robust to including HEXACO-HH Fairness, HEXACO-E, and expectations as control variables into the analyses.

To test our hypothesis H2 that individuals with higher social anxiety forecast stronger negative affective reactions to more uneven allocation also in the ultimatum game, we conducted GLMs in which we entered the total SPIN score (between-subject: continuous), the received amount (within-subject: 10%, 20%, 50%), and the interaction between SPIN score and received amount as predictors and the mean score of negative affect items (PANAS subscale upset) as outcome variable in the other half-sample. In line with our prediction and thereby conceptually replicating the results of Study 1 in a different social interaction, the interaction effect between SPIN score and received amount on forecasted negative affective reactions was significant, $F(1.41, 279.62) = 7.57$, $p = .002$, $\eta_p^2 = .04$, with stronger positive bivariate relationships between social anxiety with negative affective reactions in response to zero, $r(200) = .19$, $p = .007$, and moderate, $r(200) = .20$, $p = .005$, than high allocation

TABLE 3 Descriptive statistics and correlations between social anxiety with negative affective (PANAS subscale upset) and behavior (Group A only: allocation in ultimatum game [UG]; Group B only: acceptance level in UG and subsequent own allocation in dictator game [DG]) in response to different received allocation levels for Groups A (left) and B (right) in Study 2 for recipients in the DG and the UG, respectively

	Group A: recipients in dictator game ($N = 218$)			Group B: recipients in ultimatum game ($N = 201$)		
	M (*SD*)	Bivariate correlation with SPIN	Partial correlation with SPIN controlling for expectations	*M* (*SD*)	Bivariate correlation with SPIN	Partial correlation with SPIN controlling for expectations
Allocation in UG	43.62 (13.24)	.04	.04			
Minimal acceptance level in UG				32.76 (19.33)	−.06	−.06
	0% allocation			10% allocation		
Negative affect	2.85 (1.19)	.27***	.27***	2.51 (1.24)	.19**	.19**
Subsequent own allocation in DG				13.53 (16.41)	−.11	−.11
	25% allocation			20% allocation		
Negative affect	2.01 (0.92)	.15*	.15*	2.18 (1.10)	20**	20**
Subsequent own allocation in DG				20.07 (15.37)	−.05	−.04
	45% allocation			50% allocation		
Negative affect	1.33 (0.52)	.16*	.16*	1.10 (0.30)	−.02	−.02
Subsequent own allocation in DG				43.58 (15.21)	.07	.07

*$p < .05$.
**$p < .01$.
***$p < .001$ (two-tailed, not corrected).

levels, $r(200) = -.02$, $p = .78$. We again also found significant main effects of social anxiety, $F(1, 199) = 7.37$, $p = .007$, $\eta_p^2 = .04$, and received amount, $F(1.41, 279.62) = 18.02$, $p < .001$, $\eta_p^2 = .08$, on forecasted negative affect. One data point was identified as multivariate outlier; removing this data point from analyses did not alter the core results. These effects remained robust to including HEXACO-HH Fairness, HEXACO-E, and expectations as control variables into the analyses.

To test our hypothesis that individuals with high social anxiety would show an increased minimal accepted received allocation in the ultimatum game than individuals lower in social anxiety (H3), we conducted a GLM in which we entered the total SPIN score (between-subject: continuous) as predictor and the cut-off score as outcome variable. In contrast to our prediction, social anxiety did not predict acceptance levels in the ultimatum game, $F(1, 199) < 1$, $\eta^2 < .01$, $p = .41$. This pattern did not change considerably when including HEXACO-HH Fairness, HEXACO-E, and expectations as control variables into the analyses.

Finally, to test whether individuals with high trait social anxiety would allocate smaller amounts in a dictator game as reaction to lower allocations in an ultimatum game (interaction: Social anxiety × Received allocation in ultimatum game on dv: own allocation in dictator game), as hypothesized (H4), we conducted a GLM in which we entered the total SPIN score (between-subject: continuous), the possible received amounts in the ultimatum game (within-subject: 10%, 20%, 50%), and the interaction between SPIN score and possible received amounts as predictors and the participants' own allocation in the dictator game (0%, 5%, 15%, 25%, 35%, 45%, 55%) as outcome variable. While our analysis revealed a significant interaction between social anxiety and received allocation in the ultimatum game on own allocation in the dictator game, $F(1.40, 279.21) = 3.90$, $p = .035$, $\eta_p^2 = .02$), none of the underlying bivariate correlations between social anxiety levels and dictator game allocation in response to received ultimatum game allocation (0%, 20%, or 50%) differed significantly from 0 (all $|r| < .12$; all $ps > .11$), as displayed in Table 3. Furthermore, the interaction effect between social anxiety and received

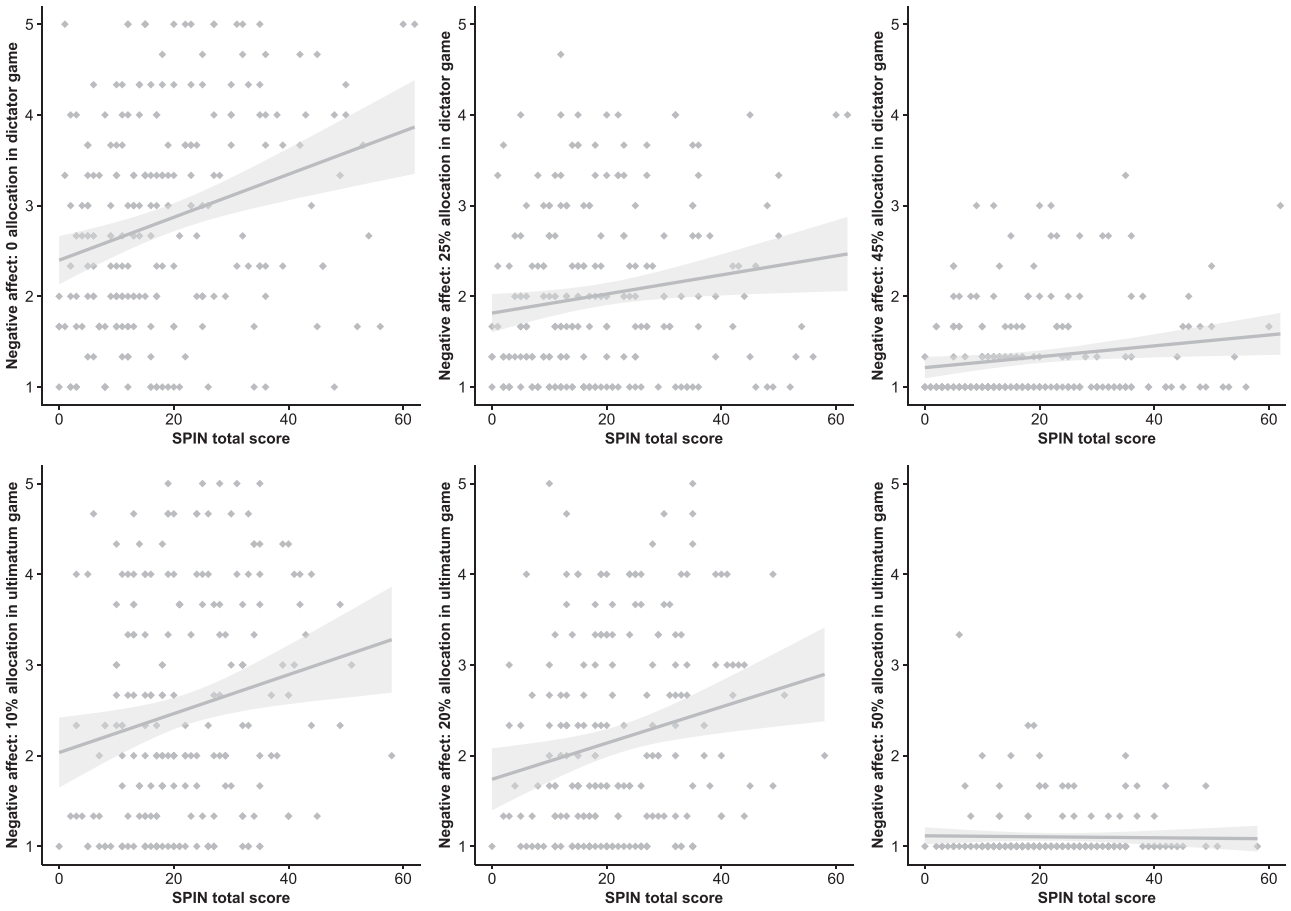

FIGURE 3 Scatter plots depicting the relationship between SPIN total score (*x* axis) and negative affect ratings for zero/very low (left), moderate (middle), and high (right) allocation levels in the dictator game (top) and the ultimatum game (bottom) in Study 2

allocation in the ultimatum game on own allocation in the dictator game formally disappeared, $F(1.40,\ 275.09) = 2.81$, $p = .081$, $\eta^2 = .01$, when HEXACO-HH Fairness, HEXACO-E, expectations, and their two-way interactions with received amount were entered as control variables into the analyses in order to test whether the observed effect was specific to social anxiety. HEXACO-HH Fairness showed both a significant main effect, $F(1,\ 196) = 6.99$, $\eta^2 = .08$, $p < .001$, and, together with the potentially received amount, a marginally significant interaction effect, $F(1.40,\ 275.09) = 3.39$, $\eta^2 = .02$, $p = .052$, in predicting the willingness to interact again with the same partner.

6 | GENERAL DISCUSSION

In two studies, we investigated whether trait social anxiety levels predict affective and behavioral reactions to uneven resource allocations by others. In line with our predictions, the results of both studies showed that highly socially anxious individuals forecasted stronger negative affective reactions in response to very and moderately uneven resource allocations by others in the dictator game. Results from Study 1 furthermore showed that they also experience stronger negative affect in response to these allocations. Study 2 moreover showed that socially anxious individuals forecasted stronger negative affective reactions in response to very and moderately uneven money allocations by others in the ultimatum game, thereby suggesting that the observed effect generalizes beyond specific allocation amounts and the situational social context of the dictator game. Interestingly, a significant positive relationship between trait social anxiety and negative affective reactions was found for an almost but not entirely even allocation (45%) for recipients in the dictator game (Study 2) while no correlations between trait social anxiety and negative affective reactions were found for entirely even allocations (50%) in either the dictator game (Study 1) or the ultimatum game (Study 2). This suggests that socially anxious individuals may be particularly sensitive even to small deviations from equality (which, speculatively, they may interpret as signs of rejection).

The finding that the relationship between trait social anxiety and affective reactions to receiving uneven resource allocations by another individual was qualitatively and quantitatively very similar between the dictator game and the ultimatum game is particularly noteworthy as allocators' affordances are very different in those two paradigms: while the allocator determines the outcome of the dictator game alone, without a possibility for the recipient to intervene,

the allocator's decision in the ultimatum game is more strategic because the recipient can reject the allocator's allocation, which would result in no one receiving any resources (see Thielmann et al., 2020, for an extensive review). In line with these different affordances, the recipients in our study did expect to receive higher allocations in the ultimatum game. However, these different affordances did not reflect in how positive and negative the recipients perceived different allocations to be—the cutoffs for perceiving the allocations as positive and negative were virtually identical between the two games. Together this suggests that while recipients acknowledge the differences in affordances for the allocator between the two social interaction situations, these differences in affordances do not systematically affect how uneven allocations are perceived by recipients and their affective reactions in response to them, irrespective of social anxiety levels.

Notably, all reported effects of social anxiety on negative affect (both forecasted and experienced) were robust to controlling for expectations, basic personality traits that have been identified as important predictors of resource allocation behavior and preferences in prior research (HEXACO Fairness facet of Honesty-Humility), and a more general emotionality (HEXACO Emotionality). In fact, social anxiety was a stronger predictor of negative affective reactions to uneven allocations in the dictator game than basic personality traits in both Studies 1 and 2. This suggests that an individual's social anxiety level is an important, yet hitherto scarcely investigated contributor to the interpersonal differences regarding cooperativeness and the affective reactions to it that are observed across manifold studies (Civai et al., 2010; Ma et al., 2017; Mischkowski et al., 2018; Olivola et al., 2020; Pfattheicher & Böhm, 2018). Furthermore, it shows that the effect on negative affective reactions is specific for social anxiety and not an artifact of a generally increased emotionality or altered expectations.

Finally, in Study 1, socially anxious individuals reported a reduced willingness to engage in further interactions with the same (but not with a different) person after more uneven allocation than the less socially anxious. This effect however disappeared when we controlled for interindividual differences in general emotionality (HEXACO-E), the tendency to be fair and genuine in dealing with others (HEXACO-HH Fairness), expectations, and their interactions with the actually received allocation amount. Instead, variations in the willingness to interact again with the same individual were predicted by general emotionality (jointly with the received allocation amount) in this analysis. This indicates that the observed increased avoidance behavior of socially anxious individuals may be driven by more general negative affective components related to emotional stability rather than being a specific effect of social anxiety.

Along similar lines but in contrast to our predictions, actual behavioral reactions in response to more or less uneven allocation levels were not systematically related to trait social anxiety in Study 2. More precisely, they were neither correlated for acceptance of others' allocations in the ultimatum game nor in own allocations to another individual in the dictator game subsequent to receiving this individual's allocation in the ultimatum game. Instead, own allocations in the dictator game were predicted by the Fairness facet of HEXACO-HH. This suggests that the observed increased avoidance behavior of socially anxious individuals may be driven by more general negative affective components related to emotional stability rather than being a specific effect of social anxiety.

The absence of a robust, social anxiety-specific behavioral effect in the presence of a robust effect of negative affect across both studies is noteworthy because negative affect—both forecasted and experienced—is known to generally be a powerful determinant of decision making (reviewed in Mellers & McGraw, 2001). Overall, it seems as if social anxiety plays an important role in negative affective reactions in response to another person's allocation while basic personality traits have more weight in predicting behavioral responses, in line with the lack of a consistent effect of more general anxiety and prosocial behavior reported in the meta-analysis of Thielmann et al. (2020). Speculatively, the different patterns between Studies 1 and 2 might be explained by the fact that our hypothetical behavioral task in Study 1 allowed individuals to exit the social situation entirely, thereby avoiding further contact with their interaction partner. In contrast, exiting the social situation was not possible in Study 2 (at least not without withdrawing from the entire study). Potentially, socially anxious individuals primarily differ from less socially anxious individuals in their social avoidance behavior (a core feature at least of clinical anxiety; e.g., Kasper, 1998) at the absence of different social decision making when interaction cannot be avoided. Because rejecting or otherwise punishing uneven resource allocations often results in more cooperative interactions afterwards (Fehr & Gächter, 2000) and can therefore at least partially be seen as a strategy to restore social relationships, while avoiding/withdrawing from a social interaction more likely further damages or even ends social relationships (e.g., Smith et al., 2008), an increased tendency to exit a social situation instead of choosing a more confrontational approach to cope with the elicited negative social affect may further contribute to social dysfunction in anticipation of or when engaging in social interactions and therefore result in a vicious circle. Future research should test this interpretation systematically by directly comparing the propensity of socially anxious individuals to exit a social situation altogether compared to staying in the social situation but retaliating or negatively reciprocating after receiving an uneven allocation by someone else.

More generally, our studies show that constructs borrowed from clinical psychology can meaningfully inform our understanding about (reactions to) inequality and social decision making in the general population. Conversely, they also provide empirical support for the call for a more extensive use of strategic games for the systematic assessment and quantification of interpersonal impairments in psychiatric disorders and other conditions relevant to well-being (for more detailed discussions, see, e.g., King-Casas & Chiu, 2012; Sharp et al., 2012). A more systematic quantification of interpersonal impairments may help to develop interventions and identify treatment targets. This approach is also highly consistent with the ongoing efforts of the National Institute of Mental Health to develop a research

classification system for mental disorders based upon dimensions of observable behavior and neurobiological measures (Cuthbert & Insel, 2013).

6.1 | Limitations

Both studies were conducted online, limiting experimental control. At the same time, this allowed us to recruit a substantially larger and more diverse study sample (e.g., age range in sample for Study 1: 18–82 years; mean age: 35 years; 63% female) than is typical for most psychological studies (Gosling et al., 2004). In addition, studies have generally shown that findings obtained in online studies do not systematically differ from findings obtained in the lab (e.g., Casler et al., 2013). Indeed, internal consistency measures in both of our samples were virtually identical to what is typically found in the literature for the well-validated SPIN (Connor et al., 2000).

Moreover, our short-term prospective designs (over the course of 1 week) do not allow us to establish directionality of our findings. Hence, long-term prospective studies will be needed to determine whether social anxiety proceeds more negative affective reactions to others' ambiguous and negative social behavior or vice versa. Ideally, these studies should additionally incorporate a double-blind intervention procedure that will furthermore allow to establish causality of the effect.

Finally, it should be noted that we tested our predictions in two subclinical samples recruited from the broader community. It is not entirely clear whether our findings generalize to individuals with clinically diagnosed social anxiety disorder. However, this approach is consistent with recent calls for studying the "full range of variation, from normal to abnormal" (Cuthbert & Insel, 2013), and our data suggest that our samples indeed covered this entire spectrum. Nevertheless, future studies may aim at specifically examining whether the observed effect of trait social anxiety to an increased likelihood of responding with negative affect to other people's ambiguous and negative social behavior translates to clinical samples of patients with social anxiety disorder.

7 | CONCLUSIONS

The present findings support our hypothesis that social anxiety is associated with more strongly pronounced negative affective reactions in response to others uneven resource allocations. Crucially, this pattern evolved for both forecasted and experienced negative affect, across different social settings, and was robust to controlling for expectations and basic personality traits, suggesting that social anxiety level is an important contributor to the interpersonal differences in affective reactions to deviations from resource allocation equality. In contrast, behavioral responses to deviations from resource allocation equality seemed to be more strongly impacted by basic personality traits such as emotionality and a general tendency to behave fairly than by trait social anxiety levels.

ENDNOTES

[1] In both preregistrations, we refer to more or less prosocial behavior rather than more or less even resource distributions. The wording was changed because an anonymous reviewer made the good point that in an ultimatum game, it is impossible to know whether a higher allocation is a result of more prosocial preferences, strategic considerations, or both.

[2] Prior to Study 1, we conducted a pilot study, which is reported in the Supporting Information (osf.io/f9tp3). The results regarding negative affect are consistent with the remaining studies, and including them in the article would not have altered our main conclusions. We initially also had hypotheses related to positive affective reactions. Because these were only preregistered for the pilot study and Part 1 of Study 1 and no consistent effects were found here, we decided to remove the hypotheses and corresponding analyses from the main paper for simplicity. They are however reported in detail in the Supporting Information (osf.io/f9tp3).

[2] In the preregistered predata reports of Study 1 (osf.io/da5rk and osf.io/4xkeh), we erroneously stated that we would control for the fear facet in Honesty-Humility rather than its fairness facet; an Honesty-Humility fear facet does not exist.

[3] In our preregistration, we had planned to enter all possible amounts (0, 25, 50, 75, 100) into the GLM. However, only five participants each received 75 and 100 points from their partners. Therefore, we restricted our main analysis to 0, 25, and 50 points for all analyses involving the real transfer amount. Analyzing the data in the preregistered way did not qualitatively change the results.

[4] As an additional robustness check, we assessed to what extent actual outcomes fell below expectations (expected minus actual allocation) and related this measure, jointly with social anxiety, to individuals' disappointment in a GLM (predictors: total SPIN score, expected minus actual allocation, and their interaction term; outcome variable: experienced disappointment at Session 2). In line with our predictions and results obtained in the main analysis, we found a significant main effect of SPIN, $F(1, 224) = 15.77$, $p < .001$, $\eta^2 = .07$, of the extent to which actual outcomes fell below expectations, $F(1, 224) = 14.66$, $p < .001$, $\eta^2 = .06$, and a significant interaction effect between the two, $F(1, 224) = 8.91$, $p = .003$, $\eta^2 = .04$.

DATA AVAILABILITY STATEMENT

Both Study 1 and Study 2 were pre-registered (Study 1, Session 1: osf.io/nmys7; Session 2: osf.io/b7wv9; Study 2: osf.io/uv4st); study materials, pre-data reports, raw data, analysis scripts, and online supplemental materials are available at osf.io/da5rk (Study 1) and osf.io/f9tp3 (Study 2 and online supplemental materials)).

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How to cite this article: Anderl, C., Dorrough, A. R., Rohrbeck, M., & Glöckner, A. (2022). The effects of trait social anxiety on affective and behavioral reactions to others' resource allocations. *Journal of Behavioral Decision Making*, *35*(2), e2259. https://doi.org/10.1002/bdm.2259

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