Belief in free will is related to internal attribution in self-perception

Oliver Genschow
(University of Cologne)

Jens Lange
(University of Hamburg)

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Author Note:

Correspondence concerning this article should be addressed to Oliver Genschow, University of Cologne, Social Cognition Center Cologne, Richard-Strauss Str. 2, 50931 Cologne, Germany, E-Mail: oliver.genschow@uni-koeln.de

Abstract

Past research indicates that individuals' belief in free will is related to attributing *others'* behavior to internal causes. An open question is whether belief in free will is related to the attribution of *one's own* action. To answer this question, we tested two opposing predictions against each other by assessing the relation of belief in free will with the self-serving bias—individuals' tendency to attribute personal success more strongly to internal forces and failure to external forces. The *resource hypothesis* predicts that a higher endorsement in free will belief relates to a lower self-serving bias. The *intention attribution hypothesis* predicts that belief in free will relates to higher internal attributions, as compared to external attributions, irrespective of success and failure. Meta-analytic evidence across five high-powered studies (total $N = 1,137$) supports the intention attribution hypothesis, but not the resource hypothesis (materials and data are available on the OSF: <https://osf.io/2a89c/>).

Keywords: free will belief, self-regulation, intention attribution, self-serving bias

Be it in the courtroom or in our daily lives, the concept of free will is fundamental for the ascription of responsibility. Thus, it does not come as a surprise that most people believe that they have free will (Baumeister et al., 2009; Nahmias et al., 2005). However, whether free will actually exists is a question that is part of a longstanding philosophical debate (Dennett, 2015; Van Inwagen, 1983). Within the last couple of decades, some cognitive neuroscientists and psychologists entered this debate by claiming that free will is nothing more than a myth (e.g., Crick, 1994; Harris, 2012; Wegner, 2002) that just arises from unconscious brain activity (Hallett, 2007; Libet et al., 1983; Soon et al., 2008). Accordingly, over the last couple of years, anti-free will viewpoints became popular not only within academia (e.g., Greene & Cohen, 2004), but also in the popular media (e.g., Chivers 2010; Griffin, 2016; Wolfe, 1997). Previous research has mainly focused on how interindividual differences in belief in free will shape the attribution of other persons' behaviors. Extending these findings, in the present article, we investigate how belief in free will affects attributions of behaviors to the self by focusing on one of the most pervasive biases in self-attribution: the self-serving bias.

Past Research on Free Will Beliefs

Previous analyses of laypeople's belief in free will indicate that free will beliefs represent metacognitive judgments about the extent to which individuals intentionally guide their thoughts and actions (Frith, 2012). More specifically, belief in free will reflects the belief that people are responsible for their actions (Carey & Paulhus, 2013), because they can decide and control their own behavior (Paulhus & Carey, 2011). A concept related to belief in free will is internal locus of control (Rotter, 1966). Although internal locus of control and belief in free will share the relation to internal causal attributions (Genschow et al., 2017), internal locus of control differs from belief in free will in other important aspects (for a review, see Feldman, 2017). First, in contrast to belief in free will, locus of control neglects agency. Second, whereas locus of control represents an evaluation of the connection between actions taken by the self and outcomes observed, the belief in free will focuses on the origins of

action and the perceived choice of enacting. Thus, not surprisingly, although previous research found that locus of control and belief in free will are correlated, belief in free will explained variance above and beyond locus of control when predicting punishing decisions (Genschow et al., 2017), job performance (Stillman et al., 2010), job satisfaction (Feldman et al., 2018), as well as life satisfaction, meaning in life, gratitude, and self-efficacy (Crescioni et al., 2016).

Within the last decade, researchers have started to investigate the psychological consequences of free will beliefs (for a review, see Ewusi-Boisvert & Racine, 2018). Such research found that individuals' belief in free will relates to several behavioral and psychological variables. For example, people's belief in free will predicted performance in a variety of contexts, such as in self-control tasks (Rigoni et al., 2012), at work (Stillman et al., 2010), or in academic settings (Feldman et al., 2016). Yet other research tested the relation of free will beliefs on individuals' tendency for retributive punishment. Such research found that the stronger individuals believe in free will, the harsher they would punish criminal offenders (Clark et al., 2014; Genschow et al., 2017; Martin et al., 2017). For example, by analyzing World Values Survey data from residents of 46 countries, Martin et al., (2017) found that free will beliefs correlated with support for severe criminal punishment. Going one step further, other research suggests that belief in free will is not only linked to punishment, but also to reward behavior. That is, research has shown that people's belief in free will correlated with the willingness to reward others for their ethical behavior (Genschow et al., 2017).

A reason for the positive relation between belief in free will with punishing and rewarding behavior is that belief in free will is related to individuals' tendency to perceive others' behavior as intentionally driven. For example, studies found that belief in free will correlated with the assumption that people are responsible for their own behavior (Nahmias et al., 2005) and their bad luck (Genschow & Vehlow, 2021). Other research showed that individuals' belief in free will is related to the attribution that others' behavior is driven by

internal, as compared to external forces (Genschow, Rigoni, & Brass, 2017). Finally, when presenting participants with video clips of soccer players who commit handball, Genschow et al. (2019) found that participants perceive stronger intentions in the soccer players' behaviors, the stronger they believe in free will.

Taken together, past research demonstrated that belief in free will is positively associated with perceiving intentionality in others' behavior and consequentially with punishing or rewarding behavior. However, such research neglected the question to which degree individuals' belief in free will is related to the perception of one's own behavior. This is rather surprising as people not only perceive others' behavior, but—maybe even more so—their own behaviors as internally driven (Pronin & Kugler, 2010). To shed light onto this open question, we sought to study the self-serving bias (Miller & Ross, 1975)—one of the strongest biases in self-perception that is known to influence individuals' self-concept, motivation, and psychological health.

Self-Serving Bias and Belief in Free Will

The self-serving bias (Miller & Ross, 1975) is among the most robust biases in self-perception (for a review, see Campbell & Sedikides, 1999) and refers to “individuals taking responsibility for successful task outcomes but blaming circumstances or other persons for failed task outcomes” (p. 378; Sedikides et al., 1998). In other words, individuals attribute personal success more strongly to the self (e.g., one's own ability, effort) and personal failure more strongly to external factors (e.g., task difficulty, bad luck). This attribution strategy is known to protect and enhance one's self-concept (e.g., Greenberg, 1991; Greenberg et al., 1982; Sedikides & Strube, 1997).

A standard experiment investigating the self-serving bias proceeds in two steps. First, participants engage in a task and then get bogus feedback. The feedback is either positive (e.g., “you were among the best in this task”) or negative (e.g., “you were among the worst in this task”). Alternatively, participants imagine a situation in which they were successful or

unsuccessful. Afterwards, participants indicate the degree to which they attribute their result to internal and external causes. The common finding is that participants attribute success more strongly to internal than external causes, an effect that is less pronounced or even reversed for failure (e.g., Blackwood et al., 2003; Miller & Ross, 1975).

Regarding the relationship between belief in free will and the self-serving bias, we derived two alternative hypotheses. The *resource hypothesis* is based on research on the relation of the self-serving bias as well as the literature on belief in free will and self-regulation. Evidence indicates that the self-serving bias is based on highly automatic processes. That is, people correct for the bias only when cognitive control is high (Krusemark et al., 2008). Research on free will beliefs, in turn, indicates that people with higher beliefs in free will are less likely to have a history of addiction to alcohol and other drugs, and are more likely to successfully quit alcohol consumption (Vonasch et al., 2017). This finding is in line with research demonstrating that belief in free will increases self-regulation (Lynn et al., 2013; Rigoni et al., 2012; Rigoni et al., 2013). Hence, people who endorse belief in free will have higher self-regulatory skills, while the self-serving bias is reduced when people engage in cognitive control. Accordingly, the resource hypothesis predicts that a higher endorsement in free will belief relates to a lower self-serving bias. More specifically, belief in free will should correlate negatively with the difference between internal and external attributions when experiencing success and/or positively with the same difference when experiencing failure.

The *intention attribution hypothesis* is based on research finding a relation between belief in free will and intentional control (Aarts & van den Bos, 2011; Lynn et al., 2014) as well as perceived responsibility (Nahmias et al., 2005). In line with these findings, recent research demonstrated that belief in free will correlates with perceiving intentionality in other people's behavior (Genschow et al., 2017, 2019). That is, when observing other people's behavior, individuals' belief in free will predicted a stronger attribution to internal forces

(e.g., personality) as compared to external forces (e.g., situation). This relation was independent of whether others' behavior was positive (e.g., donating) or negative (e.g., lying). Accordingly, when applying these insights to the self-serving bias, the intention attribution hypothesis predicts that belief in free will relates to higher internal attributions, as compared to external attributions, of one's own behavior irrespective of whether the behavior is positive or negative. In other words, belief in free will should correlate positively with the difference between internal and external attributions across experiencing success and failure.

Present Research

The goal of the present research was to test the resource hypothesis and the intention attribution hypothesis against each other. To this end, we conducted five studies. As all studies had similar methods, we sought to analyze the data in a meta-analysis.

We report all studies we ever conducted in this line of research, all manipulations, measures, and exclusions. Data analysis of each study was conducted after data collection was terminated. The materials, data, and analysis scripts are available on the Open Science Framework (OSF; <https://bit.ly/31LAq1q>)¹.

Method

Participants

In total, 1,137 participants took part in five studies (see Table 1 for more details). In Study 5, several manipulation check questions probed participants seriousness of participation. As preregistered, in Study 5, we discarded participants who either filled in less than one anagram per test ($N = 3$), or failed the attention check (additional $N = 9$). Sample size for each study was determined based on the recommendations put forward by Schönbrodt and Perugini (2013) indicating that a small to moderate correlation stabilizes at a number of 250 participants. Consequently, each study consisted of at least 250 participants before exclusions.

¹ We report an additional study in which we experimentally manipulated participants' belief in free will in the supplementary material.

An exception was Study 4, which was thought to be a pilot study to investigate whether the applied method to measure the self-serving bias produces the expected bias.

Table 1. *Demographic Information for Studies 1 to 5*

Study	Source	<i>N</i>	Country	% female	<i>M</i> _{age} (<i>SD</i>); range	Self-serving bias measure	Preregistered
1	Classroom	268	Germany	82	22.8 (7.0); 16 – 66	Recall	No
2	MTurk	254	USA	35	33.1 (9.7); 19 – 68	Recall	Yes
3	Convenience sample	248	Germany	74	24.8 (8.2); 16 – 54	Recall	No
4	MTurk	102	USA	56	37.0 (13.2); 18 – 76	Anagrams	No
5	Convenience sample	265	Germany	61	39.4 (13.1); 18 – 81	Anagrams	Yes

Note. The convenience sample consisted of participants who were recruited via student mailing lists, a participants data base, and social media.

Procedure

The procedure was very similar across studies. The exact wording of all instructions and items is openly accessible on the OSF (<https://bit.ly/31LAg1q>). One difference between the studies was the operationalization of the self-serving bias. In Studies 1 to 3, we used the paradigm applied by Blackwood et al. (2003) to assess the self-serving bias. First, participants remembered an event in which they were successful and an event in which they were unsuccessful. For each event, participants wrote a few sentences. Whether participants first remembered a successful or an unsuccessful event was counterbalanced between participants. After each event, participants indicated on 7-point rating scales (1 = *not at all*; 7 = *very much*) to which degree their performance was due to internal and external factors. We selected the items based on previous research that assessed internal and external attributions (Greenberg et al., 1982; Kitayama et al., 2006). When selecting the items, we ensured that they had low semantic overlap with the items used to measure belief in free will (for more details, see Tables S2 in the supplementary material). The items assessing internal attributions were „My skills“ and „The effort I put into the event“. The items assessing external attributions included „Environmental features (e.g., the situation, or social norms) that surrounded the event“ and

„(Bad) luck“. In Study 3 we implemented one additional item for internal attribution (i.e., „My character“) and one additional item for external attribution (i.e., „Other people“). These items are part of the respective attribution scores we calculated.

In Studies 4 and 5, we adapted another procedure that has previously been used for investigating the self-serving bias (Davis & Davis, 1972; Feather & Simon, 1971; Schneider et al., 2021). That is, participants first had to solve two sets of 20 anagrams. For each set, participants solved as many anagrams as possible within two minutes. The order of anagrams varied randomly between participants. After each set of anagrams, participants received either positive or negative bogus feedback. The positive/negative feedback read:

Prior to this study both tests were already conducted with a large number of other subjects in order to develop a normative sample. You performed better/worse than 93%/69% of the normative sample. That means you performed better/worse than most people did.

Whether participants first received positive or negative feedback varied randomly. After each feedback, participants rated the degree to which their performance was due to internal and external factors on 7-point rating scales (1 = *not at all*; 7 = *very much*). The respective items were adapted from Greenberg et al. (1982). The items assessing internal attributions included „My skills“ and „The effort I put into answering the questions“. The items assessing external attributions included „The selection of anagrams“ and „(Bad) luck“.

After assessing the attributions underlying the self-serving bias, we measured belief in free will with the validated Free Will Inventory (FWI; Nadelhoffer et al., 2014) in all studies. This scale was validated in previous research (e.g., Nadelhoffer et al., 2014) and is sought to have greater validity than other established scales such as the Free Will and Determinism Scale (FWD; Rakos et al., 2008) and the Free Will and Determinism Plus Scale (FAD-Plus; Paulhus & Carey, 2011). The FWI consists of three subscales (free will,

determinism, and dualism) each measured with five items. The free will subscale served as the main predictor of the self-serving bias in our hypotheses tests.

In Study 5, we implemented an attention check. That is, participants indicated in which block of anagrams they received the positive feedback.

At the end of each study, participants indicated basic demographic data, were debriefed, thanked, and dismissed. Study 2 was preregistered on AsPredicted.org (<https://aspredicted.org/cs4um.pdf>)², as was Study 5 (<https://aspredicted.org/fx4br.pdf>)³.

Data analytic strategy

We conducted five studies, of which two were preregistered. Although we preregistered the two studies separately, we decided to test the resource hypothesis against the intention attribution hypothesis in a meta-analysis across all studies. We analyzed the data with *R* (R Core Team, 2020; version 4.0.5) using the packages *rio* (Chan et al., 2018; version 0.5.16), *psych* (Revelle, 2018; version 2.1.3), *PerformanceAnalytics* (Peterson & Carl, 2019; version 2.0.4), and *metafor* (Viechtbauer, 2010; version 3.0-2).

To test the resource hypothesis and the intention attribution hypothesis, we calculated different contrasts for the attribution variables. The resource hypothesis predicts that belief in free will relates to a lower self-serving bias. To test this hypothesis, we created two contrasts in each study. First, we created a success contrast comparing the internal attribution for success (1) with the external attribution for success (-1). Second, we created a failure contrast, comparing the internal attribution for failure (1) with the external attribution for failure (-1). According to the self-serving bias, the success contrast should be positive and the failure contrast should be zero or even negative. Hence, if the studies would support the resource

² At the time we preregistered the study, we mistakenly assumed that an increase in internal attribution would lead to a larger self-serving bias. Consequently, we derived at the wrong hypothesis that belief in free will increases the self-serving bias (H1).

³ This preregistration was part of a Master's Thesis and contains two mistakes. First, it is important to note that in contrast to what is stated in the preregistration, the data were collected after preregistering the study. Second, H2 is mistakenly specified. It should read: The more individuals believe in free will, the smaller is their self-serving bias.

hypothesis, the relationship of belief in free will should be negative with the success contrast and/or positive with the failure contrast, leading to a less strong relationship of belief in free will with the success than the failure contrast. To test this pattern, we converted the correlation coefficients of the belief in free will scale with the success and failure contrasts from all studies to Fisher's Z and analyzed them in a multiple-endpoint, random-effects meta-analysis with Maximum Likelihood estimation (Gleser & Olkin, 2009). This analysis takes into account that each study contributed two effect sizes, creating dependence between them. We controlled for the dependence of both relationships from each study using a formula taken from Steiger (1980). In a first meta-analysis, we meta-analytically combined the relationships separately to test whether belief in free will relates negatively to the success contrast and/or positively to the failure contrast. In a second meta-analysis, we compared the relationships with each other, testing whether the relationship of belief in free will with the success contrast is smaller than with the failure contrast.

The intention attribution hypothesis predicts that belief in free will relates more to internal than external attributions. To test this hypothesis, we created an attribution contrast in each study, comparing the internal attribution for success (0.5) and failure (0.5) with the external attribution for success (-0.5) and failure (-0.5). If the studies would support the intention attribution hypothesis, belief in free will should relate positively to the attribution contrast. To test this pattern, we converted the correlation coefficients of the belief in free will scale with the attribution contrast from all studies to Fisher's Z and analyzed them in a random-effects meta-analysis with Maximum Likelihood estimation (Borenstein et al., 2010).

Even though we focused on the free will subscale of the FWI, we nevertheless report descriptive statistics, reliabilities, and all zero-order correlations involving all FWI subscales in Table 2.

Table 2. *Descriptive Statistics and Zero-order Correlations of all Measures in Studies 1 to 5*

	<i>M (SD)</i>	1	2	3	4	5	6	7
Study 1								
1 Internal Attribution Success	5.84 (1.12)	.48	-.13*	.10	.14*	.17*	.08	.15*
2 External Attribution Success	4.21 (1.42)		.20	.04	.17*	-.08	.04	.00
3 Internal Attribution Failure	4.41 (1.61)			.30	-.34*	.15*	.09	-.04
4 External Attribution Failure	4.01 (1.73)				.42	-.18*	.09	.06
5 Free Will	3.82 (1.04)					.62	-.08	.22*
6 Determinism	3.10 (1.02)						.58	-.07
7 Dualism	4.20 (1.11)							.65
Study 2								
1 Internal Attribution Success	5.68 (1.29)	.52	-.18*	.01	.00	.18*	.02	.09
2 External Attribution Success	4.04 (1.66)		.36	.17*	.38*	.18*	.41*	.17*
3 Internal Attribution Failure	4.32 (1.48)			.23	-.07	.30*	.18*	.18*
4 External Attribution Failure	4.24 (1.71)				.44	-.02	.21*	.15*
5 Free Will	4.88 (1.29)					.85	.02	.35*
6 Determinism	3.93 (1.55)						.88	.27*
7 Dualism	4.70 (1.46)							.86
Study 3								
1 Internal Attribution Success	5.50 (0.97)	.44	-.04	.13*	-.01	.12 ⁺	.00	.10
2 External Attribution Success	4.03 (1.11)		.34	.19*	.24*	-.02	.05	-.07
3 Internal Attribution Failure	4.09 (1.27)			.42	-.28*	.11 ⁺	.15*	-.02
4 External Attribution Failure	4.07 (1.25)				.38	-.08	.02	-.10
5 Free Will	4.17 (1.10)					.76	.03	.25*
6 Determinism	3.08 (1.15)						.76	-.10 ⁺
7 Dualism	4.19 (1.22)							.76
Study 4								
1 Internal Attribution Success	5.56 (1.16)	.43	.16*	.42*	.06	.30*	.19 ⁺	.03
2 External Attribution Success	4.04 (1.07)		-.04	.20*	.63*	-.05	.29*	.18 ⁺
3 Internal Attribution Failure	4.74 (1.44)			.39	.11	.15	.26*	-.22*
4 External Attribution Failure	4.03 (1.31)				.16	.09	.30*	.16
5 Free Will	5.13 (1.02)					.79	-.03	.01
6 Determinism	3.22 (1.48)						.86	.20*
7 Dualism	4.41 (1.61)							.89
Study 5								
1 Internal Attribution Success	5.41 (1.23)	.40	.22*	.38*	.20*	.25*	.02	.06
2 External Attribution Success	3.95 (1.20)		.19	.17*	.72*	-.06	.05	-.03
3 Internal Attribution Failure	4.56 (1.50)			.31	.08	.04	.04	.01
4 External Attribution Failure	4.07 (1.43)				.23	.02	.10 ⁺	.06
5 Free Will	5.02 (1.21)					.85	.04	.31*
6 Determinism	3.14 (1.33)						.84	.11 ⁺
7 Dualism	4.70 (1.43)							.86

Note. Study 1, $N = 268$; Study 2, $N = 254$; Study 3, $N = 248$; Study 4, $N = 102$; Study 5, $N = 265$; Correlations of the items assessing attributions and Cronbach's α of the FWI scales are displayed on the diagonal. In Study 3, attributions had three items each, so Cronbach's α is displayed (for all other studies, the correlation is reported). Answers for the attributions were provided on a scale from 1 (*not at all*) to 7 (*very much*). Answers for the scales were provided on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). * $p < .05$, + $p < .10$

Results

Analyses on the self-serving bias itself and manipulation checks (some were preregistered) are reported in the supplementary materials. Here, we report the meta-analytic tests of the resource hypothesis versus the intention attribution hypothesis.

Resource Hypothesis

The resource hypothesis predicts a negative relationship between belief in free will and the success contrast and/or a positive relationship with the failure contrast, leading to a less strong relationship of belief in free will with the success than the failure contrast. The main analyses failed to support the resource hypothesis (see Figure 1). Specifically, contrary to the resource hypothesis, a first meta-analysis resulted in a significant positive relationship between belief in free will and the success contrast, $Z = 0.153$, $SE = 0.053$, 95% CI [0.049, 0.257], $p = .004$ indicating that the stronger participants believed in free will, the more they attributed success internally, as compared to externally. The relationship with the failure contrast was also positive and significant, $Z = 0.123$, $SE = 0.041$, 95% CI [0.042, 0.204], $p = .003$. This indicates that the stronger participants believed in free will, the more they attributed failure internally, as compared to externally. In a final meta-analysis we tested whether the relationship of belief in free will with the success contrast is larger than the relationship of belief in free will with the failure contrast. However, in contrast to the resource hypothesis, the two relationships did not differ from each other, $Z = -0.030$, $SE = 0.082$, 95% CI [-0.191, 0.131], $p = .712$. The difference pointed even in the opposite direction of what the resource hypothesis predicts.

Intention Attribution Hypothesis

The intention attribution hypothesis predicts that belief in free will relates more to internal than external attributions irrespective of whether the event relates to success or failure. Overall, the main analyses support the intention attribution hypothesis (see Figure 2). Specifically, in line with the intention attribution hypothesis, belief in free will was positively

related to the attribution contrast, $Z = 0.171$, $SE = 0.030$, 95% CI [0.112, 0.229], $p < .001$ indicating that overall participants attributed more strongly internally than externally, the stronger they believed in free will. Follow-up meta-analyses further indicated that free will belief related positively to internal attributions for success, $Z = 0.195$, $SE = 0.030$, 95% CI [0.137, 0.254], $p < .001$, and failure, $Z = 0.154$, $SE = 0.042$, 95% CI [0.071, 0.237], $p < .001$, but there was no relationship with external attributions for success, $Z = -0.004$, $SE = 0.046$, 95% CI [-0.094, 0.087], $p = .939$, or failure, $Z = -0.050$, $SE = 0.039$, 95% CI [-0.127, 0.027], $p = .202$. Thus, the relationship of belief in free will with the attribution contrast resulted mainly from consistently high internal attributions for both success and failure rather than lower external attributions.

Figure 1. Forrest plot for the meta-analysis on the relationship of the success (internal attribution for success = 1, external attribution for success = -1, internal attribution for failure = 0, external attribution for failure = 0) and failure contrasts (internal attribution for success = 0, external attribution for success = 0, internal attribution for failure = 1, external attribution

for failure = -1) with belief in free will (i.e., free will subscale from the FWI in Studies 1 to

Fisher's Z for Relationship of Attribution Contrast with Free Will

5).

Figure 2. Forrest plot for the meta-analysis on the relationship of the attribution contrast (internal attribution for success = 0.5, external attribution for success = -0.5, internal attribution for failure = 0.5, external attribution for failure = -0.5) with belief in free will (i.e., free will subscale from the FWI in Studies 1 to 5).

Discussion

In this article, we investigated the relationship of belief in free will with the self-serving bias—one of the most robust biases in self-perception—and compared two opposing hypotheses. The resource hypothesis predicts that a higher endorsement in free will belief relates to a lower self-serving bias. That is, belief in free will should correlate negatively with the difference between internal and external attributions when experiencing success and/or positively with the same difference when experiencing failure. The intention attribution hypothesis predicts that belief in free will relates to higher internal attributions, as compared to external attributions. Accordingly, belief in free will should correlate positively with the difference between internal and external attributions across experiencing success and failure.

Meta-analytic evidence across five high-powered studies supports the prediction derived from the intention attribution hypothesis, but not the resource hypothesis.

Implications

Past research has shown that individuals' belief in free will relates to the perception that other persons' behavior is intentionally driven (Genschow et al., 2019; Nahmias et al., 2005). In line with this idea, Genschow et al. (2017) found that the more individuals believe in free will, the more they attribute others' behavior to internal (e.g., person), as compared to external (e.g., situation) factors. The present research extends these findings to the perception of one's own behavior by showing that irrespective of whether their behavior was successful or non-successful, individuals' belief in free will correlated with the degree to which they attributed their behavior to internal as compared to external forces.

The finding that belief in free will relates to the perception of one's own behavior in a similar manner as to the perception of other persons' behavior is not trivial. In many domains, the perception of others' behavior is fundamentally different from the perception of one's own behavior. For example, research on the actor-observer bias (Jones & Nisbett, 1987) demonstrates that individuals perceive others' behavior more strongly externally driven and one's own behavior more internally driven (for a critical examination, see Malle, 2006). Likewise, research on the bias blind spot (Pronin et al., 2002) indicates that individuals believe that others are more strongly influenced by cognitive biases than they are influenced by these biases themselves. Interestingly, in contrast to these examples, belief in free will seems to be a more universal force in the sense that it relates to the perception of others in a similar way as the perception of the self.

Going one step further, research from Pronin and Kugler (2010) indicates that people believe that their own lives are more strongly guided by free will (and hence internal forces) than the lives of their peers. Based on this finding, one could predict that belief in free will is more strongly related to internal attributions of people's own behavior than on the behavior of

others. As we assessed attributions that concern only the self, we are not able to empirically test this implication. However, future research may aim at directly testing whether free will beliefs predict internal attributions of people's own behavior more strongly than internal attributions of others' behavior.

The link between belief in free will and internal attributions could explain previous findings reported in the literature. For example, an increase in internal attributions can explain why people who believe in free will would punish immoral behaviors (Clark et al., 2014; Genschow et al., 2017; Martin et al., 2017) and reward moral behaviors (Genschow et al., 2017) more strongly. Indeed, first support for this idea comes from a study demonstrating that the relation between belief in free will and punishment (and reward behavior) is mediated by the correspondence bias (Genschow et al., 2017). Future research could investigate whether free will beliefs are positively related to other factors that are influenced by internal attributions such as the experience of pride, embarrassment, shame, or guilt (Tracy & Robins, 2004), for instance.

Limitations and Future Research

Despite support for the intention attribution hypothesis, we have to acknowledge several limitations. First, based on the finding that belief in free will increases self-regulatory skills (Lynn et al., 2013; Rigoni et al., 2012; Rigoni et al., 2013), the resource hypothesis predicts that a higher endorsement in free will belief relates to a lower self-serving bias. Although our results do not support this prediction, this does not mean that our results question the resource hypothesis itself, because we did not measure self-regulation per se. Our findings merely limit the range of predictions that can be derived from the resource hypothesis, as belief in free will is not related to the self-serving bias.

Second, based on a motivational account underlying free will beliefs (e.g., Clark et al., 2014), one could predict that people believing strongly in free will are motivated to make others, but not themselves, responsible for negative behavior. In light of this idea, one would

predict a positive relation between people's belief in free will and their engagement in the self-serving bias. However, as we find that free will beliefs relate positively to internal attributions for both success and failure, but not to external attributions for either success or failure, a motivational explanation cannot account for our findings.

Third, it is important to note that several studies recently reported difficulties in replicating prominent findings involving standard free will belief manipulations (e.g., Genschow et al., 2020; Monroe et al., 2017; Nadelhoffer et al., 2020; Open Science Collaboration, 2015; Schooler et al., 2014). Indeed, a recent meta-analysis (Genschow et al., 2021) indicates that although common free will belief manipulations reliably influence individuals' belief in free will, they do not affect any downstream consequences. Yet, it is important to note that even if existing free will belief manipulations have no downstream consequences, this does not imply that belief in free will has no impact on an interpersonal level. Indeed, past research found rather stable correlations between belief in free will and different behaviors such as punishment (Martin et al., 2017). In line with this research, we propose that belief in free will is related to a variety of different variables on an interpersonal level, such as internal attributions, for instance.

Fourth, one may argue that belief in free will and internal attributions are in fact the same construct. We instead think that belief in free will and internal attributions are related to each other such that a strong belief in free will predicts more internal attributions. At the same time, it is important to note that internal attributions and belief in free will are distinct constructs in so far that belief in free will represents a metacognitive concept and internal attributions relate to the interpretation of a certain behavior. This notion finds support in the method and results. First, the items measuring belief in free will differed semantically from the items we used to measure internal attributions (for details, see supplementary material). Thus, on a mere item-level, belief in free will and internal attributions are semantically distinct. Second, the correlations between belief in free will and internal attributions were

small- to medium-sized according to common guidelines. This finding indicates that although belief in free will and internal attributions share variance, they are also conceptually distinct.

Fifth, from Figures 1 and 2 it becomes apparent that not each single study produced a significant effect and that the effect sizes varied slightly between studies. A potential reason for this variation could be the somewhat low reliability of some attribution measures. In addition, given that the effects at hand are small- to medium-sized, their variation is among the to-be-expected range (Funder & Ozer, 2019). When replicating our findings, future research should keep this limitation in mind and ideally develop more reliable measures.

Sixth, in Studies 4 and 5 we provided participants with either positive or negative bogus feedback on their performance. As we did not ask participants whether they believed our feedback, it remains unclear to which degree believing in the cover story affected our results. In this respect, it is important to note that in Studies 1 to 3, participants remembered either a personal success or a failure. As these studies led to qualitatively similar results as Studies 4 and 5, we deem it unlikely that belief in the cover story played a major role. Nevertheless, future research should include questions regarding the belief of the cover story to better rule out that such beliefs influence the effects.

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