# Agency beliefs over time and across cultures: Free will beliefs predict higher job satisfaction

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**Abstract**

In three studies we examined the relationship between free will beliefs and job satisfaction over time and across cultures. Study 1 examined 252 Taiwanese real-estate agents over a three-months period. Study 2 examined job satisfaction for 137 American workers on an online labor market over a six-months period. Study 3 extended to a large sample of 14,062 employees from 16 countries and examined country-level moderators. We found a consistent positive relationship between the belief in free will and job satisfaction. The relationship was above and beyond other agency constructs (Study 2), mediated by perceived autonomy (Studies 2-3), and stronger in countries with a higher national endorsement of the belief in free will (Study 3). We conclude that free-will beliefs predict outcomes over time and across cultures beyond other agency constructs. We call for more cross-cultural and longitudinal studies examining free-will beliefs as predictors of real-life outcomes.

*Keywords*: belief in free will; job satisfaction; agency

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## Introduction

Do we have free will? This simple and abstract question has been the center of a heated philosophical debate dating back to ancient Greece and ongoing till this very day. This discussion seems far from any resolution, yet research in the last decade based in social-personality psychology and experimental philosophy has moved beyond the discussion of whether free will exists or not to a new direction examining people's free will related cognition and beliefs and their impact on behavior. Although the concept of free will may seem theoretical and philosophical in nature, a growing number of studies have shown that the belief in free will is associated with a wide array of cognitive and behavioral outcomes (see reviews; Baumeister & Monroe, 2014; Brass, Lynn, Demanet, & Rigoni, 2013).

The research on the consequences of the belief in free will has so far been focused on experimental manipulations or cross-sectional studies showing the immediate or short-term effects of the belief in free will in a single cultural context. In this research, we aimed to extend and test the generalizability of these findings by examining the effects of the belief in free will for outcomes over time and across cultures and context. For that purpose, we were specifically interested in implications of the belief in free will outside the lab, in real-life settings, and with actual implications for individuals. Only a few studies examined such implications in field settings, with initial findings indicating that the belief in free will is predictive of better academic performance (Feldman, Chandrashekar, & Wong, 2016) and better job performance (Stillman et al., 2010). To supplement these findings on performance related outcomes we examined workplace satisfaction addressing the research question of

whether the higher productivity associated with higher perceived free will would be accompanied with a higher satisfaction for believers in their work life, driven by higher perceived autonomy. Beyond the hypothesized link between free will beliefs and work satisfaction, we also aimed to make the following important contributions to the free will beliefs literature: (1) predicting outcomes over time, (2) examining cross-cultural differences, (3) assessing unique contribution above and beyond other agency constructs in the literature, and (4) providing further evidence for prediction of real-life outcomes outside the lab.

**Belief in free will**

The debate regarding the existence of free will begins with the discussion of the meaning of free will, and free will has been conceptualized in many different ways. In recent years, a group of psychologists and experimental philosophers has concluded a joint simple definition of free will as being the capacity to act freely (Feldman, 2017; Haggard, Mele, O'Connor, & Vohs, 2010). This capacity lies both in the cognition that the person can choose from several alternative options for action and in the person's perceived ability to choose among options available freely without constraints (Kane, 1996, 2002). The freedom of action is from two types of constraints – internal and external. Internal constraints include internal factors that humans have little or no control over, such as genes, gender, disabilities, intelligence, urges, desires, and needs, and even individual factors that have a strong impact on one's life trajectory, such as social status, wealth, and personality. For example, a person who believes that free will exists views people as capable of choosing their own actions and path in life regardless of their genes, social backgrounds, or personality traits, and believes that internal urges and desires can be resisted and overcome. External constraints include any factors outside the person which may be perceived as determining a person's life, such as nature (science), fate, God, or even pressures from the environment such as society and other agents. For example, a person may perceive that everything in life is causally determined by

the laws of nature or that all actions are predestined by the rule of God or fate, with no capacity for humans to effectively choose their own course of action. Importantly, in both the academic conceptualization and in laypersons' understanding of the concept of free will, free will is not about metaphysics and is not a mysterious dualistic force, but rather it is a concept representing the capacity for choice and agency (Baumeister, 2008; Feldman, 2017; Monroe, Dillon, & Malle, 2014; Monroe & Malle, 2014; Nadelhoffer, Shepard, Nahmias, Sripada, & Ross, 2014; Nahmias, Shepard, & Reuter, 2014).

Most modern societies and religions operate under some assumption of human agency and the belief in free will is endorsed by high percentage of people from around the world in different cultures (Sarkissian et al., 2010), although people do differ in the degree to which they perceive their will as free and the extent to which they endorse the belief in free will (Carey & Paulhus, 2013; Paulhus & Carey, 2011). The belief in free-will has been theorized as serving a functional role in societies and in people's lives (Hume, 1748; Kant, 1788/1997), and there is increasing empirical evidence showing that this implicit and abstract philosophical belief holds important implications for both cognition and behavior, many of them positive, which would explain the popularity of the belief in free will.

One of the dominant theories regarding the functional role of free will is that free will is only worth having if it serves to help pursue what the person wants or needs (Dennett, 2003; Edwards, 1754; Hume, 1748), by providing the self with a stronger sense of autonomy, meaning, and self-direction (Kane, 2002). It has been argued that the mechanism of unpredictability has historically evolved as means of survival by enabling humans to evade predators in nature that hunt by anticipating their prey's movement (Brembs, 2011). It has since developed to a controlled mechanism that serves the person in overcoming short-term selfish urges and needs in pursuit of long-term higher level complex motivations such as self-

actualization (Seligman, Railton, Baumeister, & Sripada, 2013) as well as for the successful coexistence with others in an organized society (Baumeister, 2008).

In support of the functional role of free will, research has shown that the belief in free will is associated with a variety of positive outcomes for the self (see review in Baumeister & Monroe, 2014). The belief in free will is predictive of higher autonomy and more proactive behavior (Alquist, Ainsworth, & Baumeister, 2013), lower helplessness and higher self-efficacy (Baumeister & Brewer, 2012), stronger identity (Seto & Hicks, 2016), higher meaningfulness (Seto, Hicks, Davis, & Smallman, 2015), and has been associated with enhanced volitional functions (Brass et al., 2013; Rigoni & Brass, 2014), such as more efficient error processing (Rigoni, Pourtois, & Brass, 2015; Rigoni, Wilquin, Brass, & Burle, 2013), better suppression of pain (Lynn, Van Dessel, & Brass, 2013), and heightened brain readiness potential for motor actions (Rigoni, Kühn, Sartori, & Brass, 2011). Together, these mechanisms help those who believe in free will in achieving better outcomes, such as better academic performance (Feldman et al., 2016) and better workplace performance (Stillman et al., 2010).

Feldman (in press) provides an in-depth review highlighting belief in free will as a unique and important agency construct, discussing conceptual differences from other well-known agency constructs in the literature and the related empirical evidence.

**Belief in free will and job satisfaction**

The belief in free will is a fundamental factor in human agency, and perceptions of agency have positive consequences for satisfaction, underlying people’s sense-making, search for meaning and purpose, true self-knowledge, and the attainment of higher well-being (Crescioni, Baumeister, Ainsworth, Ent, & Lambert, 2015; Leotti, Iyengar, & Ochsner, 2010).

A key factor underlying these agency processes leading to positive outcomes is autonomous choice. Choice is the basis for people's understanding of free will (Davidov & Eisikovits, 2015; Monroe et al., 2014), and the belief in free will is cognitively linked in layperson's minds to the concept of choice (Feldman, Baumeister, & Wong, 2014). In modern capitalist societies, especially in the west, choice is generally regarded as positive and desirable[1] (Deci & Ryan, 1985; Schwartz, 2004). To be able to make decisions effectively and enjoy the process of decision-making and related outcomes, one must perceive that choices are available and that the self is capable and in charge of making a choice (Baumeister, Sparks, Stillman, & Vohs, 2008; Monroe & Malle, 2010). The belief in free will enables the person to view life as filled with choices, to regard ordinary actions as choices, thereby driving higher motivation for facing choice, resulting in lower difficulty in tackling decisions, and finally higher satisfaction in making decisions (Feldman et al., 2014). Thus, at the workplace, people who believe in free will would perceive work life as filled with choices – that working for a company or an institution is a choice rather than an uncontrolled or deterministic obligation and that the work done for the company or institution involves a high degree of choice with little coercion or predetermination. As a result, those who believe in free will would be more likely to see their ongoing work and related actions as their own choice, to face workplace choices with greater ease, to better enjoy the outcomes of their labor, and to take pride in associated workplace achievements as their own.

We therefore expected a positive relationship between the endorsement of the belief in free will and job satisfaction, and that this relationship would be mediated by perceived autonomy which captures the perceived degree of choice afforded in the work context.

**Free will beliefs across cultures**

[1] Although we note that some research has shown that there could be too much of a good thing with possible downsides of choice overload, e.g., Markus and Schwartz (2010)

Do cultures differ in their endorsement of the belief in free will? Very little research has been done to assess cultural differences (Wente et al., 2016). The most comprehensive study to date is by Sarkissian and colleagues (2010) on free will intuitions in experimental philosophy and it concluded no significant differences in ratings of free will universe as more likely than a fully deterministic universe between participants from the United States (82%), India (85%), Hong Kong (65%), and Columbia (77%). However, research on the concept of choice suggested that perceptions of choice are socially constructed (Kitayama, Snibbe, Markus, & Suzuki, 2004; Savani, Markus, Naidu, Kumar, & Berlia, 2010; Savani, Wadhwa, Uchida, Ding, & Naidu, 2015) and recent studies on free will beliefs in children (rather than intuitions assessed by Sarkissian et al.) indeed found some support for cultural differences. Chernyak, Kushnir, Sullivan, and Wang (2013) compared Nepalese and American children and summarized that "while basic notions of free choice are universal, recognitions of social obligations as constraints on action may be culturally learned" (p. 1343), and differences were also found when comparing children from China and the United States (Gopnik & Kushnir, 2014; Wente et al., 2016). These findings are in support of the idea that the notion of free will and freedom of choice is cultural and meant to facilitate coexistence with others in society (Baumeister, 2005, 2008; Feldman, 2017; Gopnik & Kushnir, 2014; Kushnir, 2012).

We therefore expected to find cross-cultural differences in the endorsement of free will beliefs, and further hypothesized that these differences will moderate the link between free will beliefs and outcomes. If free will beliefs indeed serve social purposes and there are cultural variations, then it is likely that people will enjoy greater benefits from believing in free will in cultures that value the concept of free will.

**Free will beliefs over time**

Do free will beliefs predict outcomes over time? Research on free will beliefs has so far focused solely on studying the consequences of free will beliefs in one point in time.

Experimental methodology typically aimed to activate mindsets either endorsing or rejecting free will and then assessed dependent variables immediately following activation. Surveys asking about individual differences in free will beliefs typically measured outcomes at one point in time and together with free will beliefs. Thus, we so far have no indication of whether free will beliefs are predictive of outcomes over a period of time.

Beliefs are the building blocks of action (Fishbein & Ajzen, 1975), and considered broad and stable (Feldman, 2017). Free will beliefs even more so, as they are socially construed and facilitate long-term prospection and coordination that goes beyond immediate short-term goals and needs (Baumeister, 2008; Seligman et al., 2013). We therefore expected that free will beliefs would predict outcomes even in the long-term.

**Present investigation**

The present investigation examines the relationship between the belief in free will and job satisfaction. Beliefs are generally considered to be stable over time with relatively minor fluctuations and prevalent in most cultures, yet so far there have been very little empirical data on the belief in free will as a predictor of outcomes over time and across cultures. Three studies investigated the link between the belief in free will and job satisfaction in various contexts, several cultures, and in more than one point in time. Study 1 included a sample of real-estate agents in Taiwan over a three-months period. Study 2 examined an American sample over a six-months period. Study 3 extended to a large cross-cultural cross-occupational sample using the World Values Survey (WVS) from 16 countries. The supplementary file includes power analyses and materials used in the three studies, and data and code were made available on the Open Science Framework (https://osf.io/d2e6s/).

## Study 1 – Taiwanese real-estate agents' job satisfaction

**Method**

**Participants and procedure.**

We conducted the study in 54 branch offices of a publicly listed real estate agency company in Taiwan. We distributed the surveys to the agents (in Chinese) in two waves of surveys separated by a three-months time-lag. A total of 293 returned questionnaires in Time 1 ($M_{age}$ = 30.46; $SD_{age}$ = 5.43; 79% males; 89.9% with higher education), and of those 252 also returned the questionnaire in Time 2 ($M_{age}$ = 30.77; $SD_{age}$ = 5.15; 82% males; 91% with higher education; 74% response rate).

**Measures.**

Scales were translated from English to Chinese using back translation procedure (Brislin, 1970) and were then verified by senior researchers who are Chinese native speakers (see supplementary for details).

***Belief in free will***. Belief in free will was measured using the eight-item personal will subscale of the FWD scale (Rakos, Steyer, Skala, & Slane, 2008), in which participants rated their agreement with statements regarding having free will, such as "I have free will" and "I am in charge of my actions even when my life's circumstances are difficult" (1 = *Strongly disagree*; 6 = *Strongly agree*). Belief in free will ratings were collected in Time 1 (α = .74).

***Job satisfaction.*** Job satisfaction was measured using the Dubinsky and Hartley (1986) three-item scale, with the following items: "Generally speaking, I am very satisfied with my job", "I am generally satisfied with the feeling of worthwhile accomplishment I get from doing this job", and "I am satisfied with the kind of work I do in this job" (1 = *Strongly disagree*; 7 = *Strongly agree*). Job satisfaction ratings were collected at both Time 1 and Time 2 (Time1: α = .95, Time2: α = .93).

**Results and discussion**

Means, standard deviations, and correlations for the measures are detailed in Table 1. The two job satisfaction measures in Time 1 and Time 2 were significantly correlated ($r$ = .43, $p$ < .001), and the belief in free will was positively correlated with both job satisfaction measures (Time1: $r$ = .36, $p$ < .001, CI [.25, .45]; Time2: $r$ = .19, $p$ = .002, CI [.07, .31]). A repeated-measures analysis revealed no significant temporal differences in job satisfaction, and there was no interaction between free will beliefs and time in predicting job satisfaction.

Study 1 showed support for the positive relationship between the belief in free will and job satisfaction for real-estate agents in Taiwan. The relationship was consistent over a three-month time-lag between the collection of free will beliefs and ratings of job satisfaction.

## Study 2 – Amazon Mechanical Turk American workers' job satisfaction

Study 2 was constructed to (1) test the generalizability of the findings in Study 1 by examining a workplace in a different culture and for diverse types of tasks, and (2) compare free will beliefs to other related agency constructs (for a review, see Feldman, 2017).

Amazon Mechanical Turk (MTurk) is a diverse online labor market for hundreds of thousands of people from all over the world, serving as a connecting platform between employers ("requesters") and employees ("workers"). Requesters offer tasks ("HIT"s) in return for a specified amount of money, and workers that match the HIT criteria and are interested in the task and the offered compensation may choose to accept the HIT and complete the task. Upon a successful completion of the task and the approval by the requester, MTurk facilitates the payment from the requester to the worker. The tasks offered on MTurk can be anything from simple tasks answering a single-item questionnaire to very complicated tasks requiring specialized skills such as copy-editing or sophisticated calculations or data analysis. The level of compensation per task starts as low as one cent and ranges to very high compensation for complicated tasks, but on average is around several dollars for around half

an hour. The MTurk workers engage in a wide variety of tasks for a large number of employers, and therefore, the measure of job satisfaction for work on MTurk captures the overall satisfaction that MTurk workers have from their overall work across all tasks and employers. MTurk is typically used in academic studies to collect data, yet in this study we examined behavior on MTurk for what it is – a real-life workplace.

## Method

### Participants and procedure.

Participants were surveyed in two waves. A total of 209 American participants were recruited online using Amazon Mechanical Turk (MTurk) and answered a questionnaire regarding their work on MTurk in return for 1US$. Six months later, we contacted the workers and invited them to participate in a follow-up study in return for 2US$. In both times, we allowed data collection for a period of 15 days. In Time 2, we sent three email reminders at three-day intervals to those who have not yet answered the invitation to participate again. A total of 137 participants responded to our invitation and completed the second part of the survey, representing a 66% response rate.

### Measures.

***Belief in free will***. The Rakos et al. (2008) includes subscales measuring beliefs related to the question of free will. The scales can be categorized either by personal-general or by topic. In Study 1 we collected the personal free-will subscale, yet some of the items in that subscale were about moral responsibility and religiosity rather than purely about agency (e.g., “my decisions are influenced by a higher power”; “my choices are limited because they fit into a larger plan”; both reversed). These items capture more than the mere belief in free will, and may have resulted in weaker effects in Study 1 and may result in different effect-size in societies with different religions.

Therefore, in Study 2 we collected the full scale. The free-will and personal-agency scales were the closest empirically to the conceptual idea of the belief in free will, and were indeed found to exhibit the strongest relationship to job satisfaction. The responsibility subscales (moral responsibility and personal responsibility) and religiosity (higher power control, personal limitations) were not specifically about free-will and agency, and showed weaker effects. In Study 2 we therefore report the effect for a combined scale of free-will and personal agency subscales as the free will belief measure. The measure includes the nine-item of the free-will and personal agency subscales of the scale (α = .88). In the supplementary materials (p. 9) we report correlations for the entire scale and subscales with further details and analyses.

***Job satisfaction***. Job satisfaction on MTurk at both Time 1 and Time 2 was measured using an adaptation of the five items short scale of Brayfield and Rothe (1951) constructed by Judge, Locke, Durham, & Kluger (1998). The items were adjusted to reflect satisfaction with the online work on MTurk – "I feel fairly well satisfied with my present job doing MTurk tasks", "Most days I am enthusiastic about the work I do on MTurk", "Every time I work on tasks on MTurk it feels like forever" (reversed), "I find real enjoyment in the work I do on MTurk", and "I consider the kind of work I do on MTurk rather unpleasant" (reversed) using a seven-point scale (1 = *Strongly disagree*; 7 = *Strongly agree;* Time1: α = .79; Time2: α = .84).

***Job autonomy***. Job autonomy was measured using the Hackman and Oldham (1980) scale adjusted for MTurk with the following three items: "I have significant autonomy in determining how I do my job on MTurk," "I can decide on my own how to go about doing my work on MTurk," and "I have considerable opportunity for independence and freedom in how I do my job on MTurk" (1 = *Strongly Disagree*; 7 = *Strongly Agree*; Time1: α = .83; Time2: α = .85).

***Related agency constructs***. We measured a number of other agency constructs that were previously linked with job satisfaction as controls and for comparison of effect-size: Trait locus of control (Rotter, 1966; α = .58), implicit beliefs (Dweck, 2000; α = .90), trait self-esteem (Rosenberg, 1965; α = .92), job self-efficacy (Judge et al., 1998; α = .90), and trait self-control (Tangney, Baumeister, & Boone, 2004; α = .89).

**Results and discussion**

Means, standard deviations, and correlations are detailed in Table 2. The belief in free will was positively correlated with job satisfaction in Time 1 ($r$ = .31, $p$ = .001, CI [.18, .43]) and Time 2 ($r$ = .31, $p$ < .001, CI [.15, .45]), even when controlling for trait locus of control, implicit beliefs, trait self-esteem, job self-efficacy, and trait self-control (Time1: partial $r$ = .15, $p$ = .04, CI [.02, .28]; Time2: partial $r$ = .18, $p$ = .042, CI [.01, .34]). We again found no indication for temporal differences in job satisfaction or for an interaction between free will beliefs and time.

Following the method reported by Stillman et al. (2010) to determine relative impact on an outcome, we included all agency constructs in a stepwise multiple regression on job satisfaction. The analysis revealed free will beliefs as a significant predictor of Time1 job-satisfaction ($\Delta R^2$ = .02, $p$ = .039) together with trait self-esteem, job self-efficacy, and trait self-control, and of Time2 job-satisfaction ($\Delta R^2$ = .04, $p$ = .016) together with only job self-efficacy. Next, a hierarchical multiple regression on job satisfaction controlling for all agency constructs showed that free will beliefs significantly improved the model beyond the other predictors (Time1: $F$(6, 202) = 8.62, $p$ < .001, $\Delta R^2$ = .02, $p$ = .035; Time2: $F$(6, 130) = 4.83, $p$ < .001, $\Delta R^2$ = .03, $p$ = .042).

We proceeded to examine job autonomy as a mediator. Free will beliefs correlated with job autonomy (Time1: $r$ = .46, $p$ < .001, CI [.34, .56]; Time2: $r$ = .50, $p$ < .001, CI

[.36, .62]), even when controlling for the agency constructs (Time1: partial $r = .32$, $p < .001$, CI [.19, .44]; Time2: partial $r = .36$, $p < .001$, CI [.21, .54]) and job autonomy correlated with job satisfaction (Time1: $r = .43$, $p < .001$, CI [.31, 53]; Time2: $r = .59$, $p < .001$, CI [.47, .69]). We ran a bootstrapping mediation analysis (bias-corrected confidence estimates, 95%, 10000 bootstraps; Preacher & Hayes, 2008) which showed that the relationship between free will beliefs and job satisfaction was mediated by job autonomy (Time1: indirect $\beta = .25$, CI [.14, .39], direct $\beta = .21$, CI [.00, .41], $p = .048$, SOBEL $p < .001$; Time2: indirect $\beta = .50$, CI [.27, .57], direct $\beta = .03$, CI [-.25, .30], $p = .851$ns, SOBEL $p < .001$).

Study 2 showed further evidence of the direct relationship between the belief in free will and job satisfaction for work conducted by Americans in an online labor market over a six months' period, above and beyond other agency constructs, and with job autonomy as a mediator of the relationship.

## Study 3 – Job satisfaction across cultures

Studies 1-2 demonstrated that the belief in free will predicted job satisfaction for Taiwanese real estate agents and for Americans online workers. Study 3 aimed to generalize the findings even further, to include a large cross-cultural sample with participants from all over the world and working in a wide array of professions. We again tested job autonomy as a mediator of the relationship, and further explored country-level differences and moderators.

### Method

#### Participants and procedure.

The WVS (2008) is a survey collected between 1990 and 2008 of 257,597 participants from over 40 countries (over 70% of the countries in the world). Of the participants included in the WVS sample, 14,062 participants from 16 countries answered the measures of the belief in free will, job satisfaction, and job autonomy.

**Measures.**

***Belief in free will***. One item was used to assess the belief in free will in the WVS dataset (a173) through perceptions of freedom of choice and control: "Indicate how much freedom of choice and control you feel you have over the way your life turns out" (1 = *no choice and control* to 10 = *a great deal of choice and control*). This WVS item was previously used as a measure of the belief in free will (e.g., Clark et al., 2014).

***Country-level beliefs in free will***. Individual-level beliefs in free will (above) were aggregated to form a measure of country-level endorsement of belief in free will.

***Job satisfaction***. One item measured job satisfaction (c033) - "Overall, how satisfied or dissatisfied are you with your job?" (1 = *Dissatisfied* to 10 = *Satisfied*). For a discussion in support of single-item measures for job satisfaction see Dobrow Riza, Ganzach, and Liu (2016).

***Job autonomy***. One item measured participants' perceptions of freedom of choice autonomy at work (c034) - "How free are you to make decisions in your job?" (1 = *None at all* to 10 = *A great deal*).

**Results and discussion**

Means, standard deviations, and correlations for the measures are detailed in Table 3. The belief in free will positively correlated with job satisfaction ($r$ = .22, $p$ < .001, CI [.21, .24]), and job autonomy ($r$ = .22, $p$ < .001, CI [.21, .24]). Job autonomy also positively correlated with job satisfaction ($r$ = .48, $p$ < .002, CI [.47, .49]). Controlling for job autonomy reduced the main effect (partial $r$ = .13, $p$ < .001) suggestive of a mediation. A bootstrapping mediation analysis (bias-corrected, 95% intervals, 10000 resamples; Preacher & Hayes,

2008) revealed that the relationship between the belief in free will and job satisfaction was indeed mediated by job autonomy (β = .10, CI [.09, .11])[2].

The strength of the correlation between the belief in free will and job satisfaction varied among countries. Table 4 details the correlations between the belief in free will and job satisfaction by country. Some countries showed a very weak correlation (e.g., Japan: $r$ = .05, $p$ = .209ns, CI [-.02, .12]; Poland: $r$ = .03, $p$ = .466ns, CI [-.04, .10]) and some countries exhibited much stronger correlations (e.g., Mexico: $r$ = .42, $p$ < .001, CI [.37, .47]; South Africa: $r$ = .34, $p$ < .001, CI [.29,.38]), suggestive of a national level moderator. The correlations were found higher in the countries with a higher average endorsement of the belief in free will ($r$ = .59, $p$ = .015, CI [.13, .84]; see Table 4 for country-level scores for free will beliefs). We proceeded to conduct a multi-level modeling analysis. Country-level differences accounted for 5% of the variance in job satisfaction, and country-level endorsements of the belief in free will was a significant predictor of job satisfaction, with a significant interaction between individual-level and country-level beliefs in free will (see Table 5 for summary of findings, and Figure 1 for a plot of the interaction).

In summary, findings from the WVS large-scale cross-cultural data archive supported the findings from Studies 1-2 showing the belief in free will as a predictor of job satisfaction. As in Study 2, the relationship was mediated by job autonomy. Findings also revealed that the relationship was strongest in countries with a higher average endorsement of the belief in free will, meaning that in countries where the belief in free will was more important, believing in free will was more likely to predict higher job satisfaction.

[2] Due to the very large sample size, all effects are significant.

## General results: Mini meta-analysis

We followed the emerging practice of performing a mini meta-analysis of all studies to assess the overall effect size (Goh, Hall, & Rosenthal, 2016; Lakens & Etz, 2017; McShane & Böckenholt, 2017). The overall effect size for the basic link between free will beliefs and job satisfaction in Time 1 (Studies 1-3) was .29 [.19, .39] and the effect for Time 2 (Studies 1-2) was .25 [.13, .38] (Schulze, 2004 using metacor R package, DerSimonian-Laird method). These can be summarized as typical to large effects (Gignac & Szodorai, 2016; Richard, Bond, & Stokes-Zoota, 2003).

## General discussion

Three studies demonstrated the positive relationship between the belief in free will and job satisfaction. Table 6 provides a summary of the results. In Study 1, the belief in free will predicted higher job satisfaction for real-estate agents in Taiwan following a three months' time-lag. In Study 2, the belief in free will predicted higher job satisfaction of Americans working in diverse tasks for multiple employers in an online labor market over a six-months period, and when controlling for other agency constructs. In Study 3, the belief in free will was associated with better job satisfaction in a large sample across 16 cultures and a wide array of occupations, and country-level belief in free will was shown to moderate the effect. In Studies 2 and 3 perceived job autonomy mediated the relationship.

### Belief in free will as a predictor of workplace outcomes

We contribute to a growing line of research showing that the abstract philosophical belief in free will is an important predictor of everyday life cognition and behavior (Baumeister & Monroe, 2014), and that this belief is predictive of positive outcomes in the workplace. The belief in free will has previously been shown to predict better job performance (Stillman et al., 2010), and our findings show that not only is the belief predictive of higher productivity but that it also predicts higher satisfaction with work

performed. The relationship between job satisfaction and job performance has received wide attention in the literature with several suggested models, but over time findings have converged on a weak correlation between the two outcomes (Judge, Thoresen, Bono, & Patton, 2001), and the belief in free will is a significant predictor of both positive outcomes.

We also demonstrated that the belief in free will predicts job satisfaction above and beyond other agency constructs. The belief in free will goes beyond other agency constructs in making the differentiation between agentic versus non-agentic actions (Malle, 2011), rather than between internal versus external (i.e., locus of control) or between the perceived ability or inability to execute (i.e., self-efficacy) which overlook the importance of agency in perceived choice in making decisions leading to outcomes (Feldman, 207).

Studies 2 and 3 showed that job autonomy mediated the relationship between the belief in free will and job satisfaction. The belief in free will facilitates perceiving work tasks as free choices, which in turn predicts higher job satisfaction. Choice and autonomy are important in the work context (Rosso, Dekas, & Wrzesniewski, 2010; Wrzesniewski, Dutton, & Debebe, 2003), and it is very likely that these positive factors and the associated job satisfaction would also be reflected in other positive organizational outcomes, such as higher organizational citizenship behaviors and lower counterproductive work behaviors.

**Belief in free will as a predictor of outcomes over time**

Our findings suggest that the belief in free will is predictive of outcomes over a period of time. Research on the belief in free will has so far been mainly focused on examining the consequences of the belief in free will in one point of time, with mostly priming or cross-sectional studies (see Baumeister & Monroe, 2014 for a review), and our findings take the first step in showing that the belief in free will is predictive of outcomes over a period of several months and across a wide variety of jobs and cultural contexts.

**Belief in free will across cultures**

We found that the relationship between the belief in free will and job satisfaction extends across cultures. Study 1 was conducted using a Taiwanese sample, and Study 2 was conducted using an American sample. The cross-cultural sample of 16 countries in Study 3 further allowed us to examine the impact of cross-cultural differences in the relationship between the belief in free will and job satisfaction. A test of country-level moderators revealed that the national endorsement of the belief in free will is a moderator of the relationship such that the relationship was strongest in countries with stronger beliefs in free will. To our knowledge, Study 3 is the first test of cross-cultural differences in the national endorsement of the belief in free will and its implications, and it challenges previous research which argued for only minor variations in free will beliefs across cultures (Sarkissian et al., 2010). Our findings reveal that not only are there differences between countries in the popularity of the belief in free will, but that these may serve as a meaningful moderator of the relationship between the belief in free will and outcomes.

The belief in free will is conceptually related to the concept of choice (Feldman et al., 2014) and it has been shown that the concept of choice holds different meanings across cultures (Savani, Markus, & Conner, 2008; Savani et al., 2010). It is therefore also plausible that cross-cultural differences in regards to free will beliefs are not limited to the extent to which different cultures endorse the belief in free will, but also extend to the meaning that they give free will. Future research is needed to better understand such cultural variations. An extended discussion of limitations and future directions is provided in the supplementary.

**Mechanism and function of free-will**

Why is belief in free will associated with positive outcomes? In the introduction we reviewed the literature showing that the belief in free will is associated with many positive outcomes for the self. A complementary line of research has shown that the belief in free will

is also predictive of positive social outcomes. Free will beliefs have been associated with higher honesty (Vohs & Schooler, 2008), higher morality (Carey & Paulhus, 2013; Caspar, Vuillaume, Magalhães De Saldanha da Gama, & Cleeremans, 2017), less prejudice (Zhao, Liu, Zhang, Shi, & Huang, 2014), more prosocial behavior and less aggression (Baumeister, Masicampo, & DeWall, 2009), better learning from and more guilt over own misdeeds (Stillman & Baumeister, 2010), more cooperation (Protzko, Ouimette, & Schooler, 2016), less objectification of others (Baldissarri, Andrighetto, Gabbiadini, & Volpato, 2016), higher gratitude (MacKenzie, Vohs, & Baumeister, 2014). It would seem, that there is overwhelming evidence for free will beliefs as predicting positive outcomes both for the self and for social behavior. What is it about the concept of free-will and the associated abstract philosophical belief that may lead to such an impact?

In our studies we focused on one mechanism, the concept of choice. Choice is very strongly linked with the concept of free will (Baumeister, 2008; Baumeister & Monroe, 2014; Feldman, 2017; Feldman et al., 2014). Choice is an important element for a number of reasons. It is perceived as an essential element for deliberation, goal pursuit, and planning, which in turn lead to stronger associations with responsibility, accountability, reflection, learning, meaningfulness, and finally, well-being and satisfaction (Deci & Ryan, 1985; Patall, Cooper, & Robinson, 2008; Ryan & Deci, 2000). Free will beliefs are about the capacity for choice rather than choice itself, and so does not necessary suffer from some of the possible downsides of choice, such as the demotivation with having too much choice (Grant & Schwartz, 2011; Iyengar & Lepper, 2000; Schwartz, 2004). Other factors associated with free will, such as action-control, self-regulation, and theory of mind, may operate on a higher level to direct choices towards the less selfish, less harming, and overall less negative options.

Regardless of whether free will exists or not, the belief in free will, or the 'illusion of free will' (Wegner, 2004), seems to have real implications for people in their lives and is considered an essential component for culture, modern societies, and legal systems (Baumeister & Monroe, 2014; Monroe, Vohs, & Baumeister, 2016).

**Implications**

Beliefs matter, not only generally in life, but more specifically in the organizational context. The belief in free will has previously been shown as a predictor of performance (Stillman et al., 2010), and our findings complement that research in showing that the increased productivity is also accompanied with higher job satisfaction. Together, these findings suggest that it is important for managers to understand employees' beliefs and perceptions of agency, as these are linked to the perceptions of choice and satisfaction with achievements. Beliefs in free will, like any other set of beliefs, are important for the people who hold them, and we therefore caution against a conclusion that beliefs should be manipulated or that employees should be selected based on their set of beliefs. What our research suggests, is that the understanding of employees set of beliefs can help managers better adjust to specifically address individual needs. If those who disbelieve in free will find it harder to naturally experience satisfaction with their work, managers should work with these employees more closely to either find other means of raising satisfaction or compensating for the lack of satisfaction in other respects.

Another important aspect is that there are cultural differences in the societal endorsement of the belief in free will and these differences may affect certain outcomes and moderate well-established predictors of organizational outcomes. Managers working with diverse multi-cultural teams should take note of the cultural differences in the endorsement of core beliefs associated with desired outcomes in the workplace.

**Limitations and future directions**

We also note limitations in our research. All studies are correlational, which prevents any causal interpretations. Some research about the psyche of free will perceptions demonstrated the illusion of free will, that people associate more freedom with positive outcomes, meaning that it is possible that those who enjoy greater satisfaction with their work also come to endorse stronger beliefs in free will. However, beliefs are considered stable and enduring in comparison to context-specific job satisfaction, and we have shown that the relationship holds across job contexts and over time. To address this limitation, future studies may aim to conduct an experimental intervention of free will beliefs at work to observe its impact on job satisfaction and other work-related outcomes.

Another possibility related to the correlational nature of the studies is that there are other factors that may influence both free will beliefs and job satisfaction, such as the job context or occupation. For example, it could be possible that a relatively independent work context or an organization granting high levels of job autonomy would lead to endorsing higher beliefs in free will and higher job satisfaction. This concern is particularly relevant for Study 3 where occupation varies among participants, but this is partially addressed by Studies 1 and 2 where occupation was fixed. Still, there could be other factors at work. Future studies may aim to examine the importance of job context and occupation for the endorsement of free will beliefs, and explore other factors that may impact both free will beliefs and job satisfaction.

So far most of the literature on the outcomes associated with the belief in free will have linked this belief to positive outcomes, yet there are few things in life that are all positive, and therefore more research needs to be done to understand the possible downsides of believing in free will. For example, some of the recent research has shown that the link between belief in free will and moral responsibility leads to believers showing higher

punitiveness (Carey & Paulhus, 2013; Clark, Baumeister, & Ditto, 2017; Clark et al., 2014) and retribution (Shariff et al., 2014), such that they are more likely to attribute high accountability to bad behavior and seek stronger penalties, possibly even when outcomes were a result of uncontrollable circumstances or when penalties are less efficient than facilitating learning in other ways.

## Conclusion

In three studies we highlighted the importance of agency beliefs, establishing the link between the belief in free will and job satisfaction, showing that the link persists over time, and shedding light on the mechanism and possible cultural moderators, thereby paving the way for many promising future research directions.

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## Tables

Table 1

*Study 1 means, standard deviations, and correlations*

| | Mean | Standard Deviation | Belief in free will (T1) | Job satisfaction (T1) | Job satisfaction (T2) |
|---|---|---|---|---|---|
| Belief in free will (T1) | 3.99 | .49 | (.74) | | |
| Job satisfaction (T1) | 5.64 | 1.18 | .36*** | (.95) | |
| Job satisfaction (T2) | 5.74 | .99 | .19** | .43*** | (.93) |

*Note*. Alpha coefficients are presented on the diagonal. T1 = Collected in Time 1 (N = 293), T2 = collected in Time 2 (N = 252). * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tail).
Scales: Beliefs in free will 1-6; Job satisfaction 1-7.

Table 2

*Study 2 means, standard deviations, and correlations*

| | Mean | SD | Job satisfaction (T1) | Job satisfaction (T2) | Belief in free will (T1) | Job autonomy (T1) | Job autonomy (T2) |
|---|---|---|---|---|---|---|---|
| Job satisfaction (T1) | 4.97 | 1.05 | (.79) | | | | |
| Job satisfaction (T2) | 4.93 | 1.22 | .73*** | (.84) | | | |
| Belief in free will (T1) | 4.98 | .72 | .31*** | .31*** | (.88) | | |
| Job autonomy (T1) | 5.61 | 1.11 | .43*** | .43*** | .46*** | (.83) | |
| Job autonomy (T2) | 5.65 | 1.17 | .51*** | .59*** | .50*** | .58*** | (.85) |
| Trait locus of control (T1) | 6.89 | 2.47 | .09 | .06 | .20** | .03 | .01 |
| Implicit beliefs (T1) | 3.03 | 1.04 | -.10 | -.18* | -.19** | -.07 | -.15† |
| Trait self-esteem (T1) | 5.29 | 1.25 | .35*** | .30*** | .35*** | .33*** | .34*** |
| Job self-efficacy (T1) | 6.07 | .96 | .34*** | .32*** | .44*** | .43*** | .52*** |
| Trait self-control (T1) | 3.48 | .77 | .30*** | .24** | .19** | .17* | .17* |

*Note*. T1 = Collected in Time 1 (N = 209), T2 = collected in Time 2 (N = 137); Reliability alpha coefficients are presented on the diagonal. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. SD = standard deviation.
Scales: Beliefs in free will 1-6; Job satisfaction, job autonomy, trait self-esteem, trait self-efficacy, implicit beliefs, 1-7; Locus of control: 0-13; Trait self-control: 1-5 (see supplementary).

Table 3

*Study 3 means, standard deviations, and correlations*

| | Mean | Standard Deviation | Belief in free will | Job satisfaction |
|---|---|---|---|---|
| Belief in free will | 6.88 | 2.37 | - | |
| Job satisfaction | 7.32 | 2.38 | .22 [.21, .24] | - |
| Job autonomy | 6.76 | 2.82 | .22 [.21, .24] | .48 [.47, .49] |

*Note*. N = 14,062. Due to the large sample size, all correlations were significant $p < .001$. Values in brackets are 95% confidence intervals.
Scales: Beliefs in free will, job satisfaction, job autonomy 1-10.

Table 4

*Study 3: Correlations between belief in free will and job satisfaction by country in the WVS*

| Country | FWmean | Correlation | N | Country | FWmean | Correlation | N |
|---|---|---|---|---|---|---|---|
| Argentina | 7.33 | .21*** | 571 | Nigeria | 6.93 | .19*** | 702 |
| Brazil | 7.46 | .16*** | 974 | Poland | 6.48 | .03ns | 894 |
| Chile | 7.17 | .23*** | 813 | Russia | 6.25 | .20*** | 1268 |
| China | 7.06 | .32*** | 5228 | Slovakia | 6.26 | .15** | 386 |
| Czech Republic | 6.29 | .11** | 739 | South Africa | 7.03 | .34*** | 1467 |
| India | 6.20 | .28*** | 1203 | South Korea | 6.74 | .23*** | 942 |
| Japan | 5.78 | .05ns | 876 | Spain | 6.69 | .23*** | 576 |
| Mexico | 7.74 | .42*** | 965 | Switzerland | 7.36 | .22*** | 885 |

*Note*. FWmean = national average of the belief in free will; Correlation = the correlation between belief in free will and job satisfaction for the specified country. N = number of participants from the specified country. ns $p > .05$ ** $p < .01$, *** $p < .001$.

Table 5

*Study 3: Multi-level modeling analysis examining the interaction of individual-level and country-level free will beliefs in predicting job satisfaction*

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---|---|---|---|---|---|---|---|---|
| | B | SE | B | SE | B | SE | B | SE |
| Intercept | 7.18*** | 0.13 | 5.59*** | 0.15 | 3.0389* | 1.24 | 3.34* | 1.25 |
| Individual level FW beliefs | | | 0.23*** | 0.02 | 0.23*** | 0.02 | -0.24 | 0.22 |
| Country level FW beliefs | | | | | 0.61** | 0.18 | 0.56** | 0.18 |
| Individual x country FW beliefs interaction | | | | | | | 0.07* | 0.03 |
| Residual | 5.27 | 2.30 | 4.94 | 2.22 | 4.94 | 2.22 | 4.94 | 2.22 |
| Intercept | 0.28 | 0.53 | 0.32 | 0.57 | 0.18 | 0.42 | 0.18 | 0.42 |
| Conditional $R^2$ | 0.05 | | 0.10 | | 0.11 | | 0.11 | |
| Fit (deviance, DF) | 61087.6 | 3 | 60242.5 | 5 | 60230.3 | 7 | 60226.1 | 8 |

Table 6

*Summary of the studies and findings*

| # | Sample size | Occupation | Country | Belief in free will measure | Job satisfaction measure | Effect size | Notes / contributions |
|---|---|---|---|---|---|---|---|
| T1: Mini-meta | | | | | | .29 [.19, .39] | Studies 1-3 |
| T2: Mini-meta | | | | | | .25 [.13, .38] | Studies 1-2 |
| 1 | T1:293<br>T2:252 | Real estate agents | Taiwan | Rakos et al. (2008) | Dubinsky and Harley (1986) | T1: .35<br>T2: .19 | Baseline effect |
| 2 | T1: 209<br>T2: 137 | Online tasks on MTurk | USA | Rakos et al. (2008) | Short Brayfield and Rothe (1951) | T1: .31<br>T2: .31 | 1) Replication in the USA<br>2) Related agency constructs<br>3) Autonomy mediator |
| 3 | 14,062 | Various | World | WVS 1-item | WVS 1-item | .22 | 1) Generalizability<br>2) Country comparisons<br>3) Individual-country interaction |

Note. T1 = Time 1, T2 = Time 2; WVS = World values survey.

## Figures

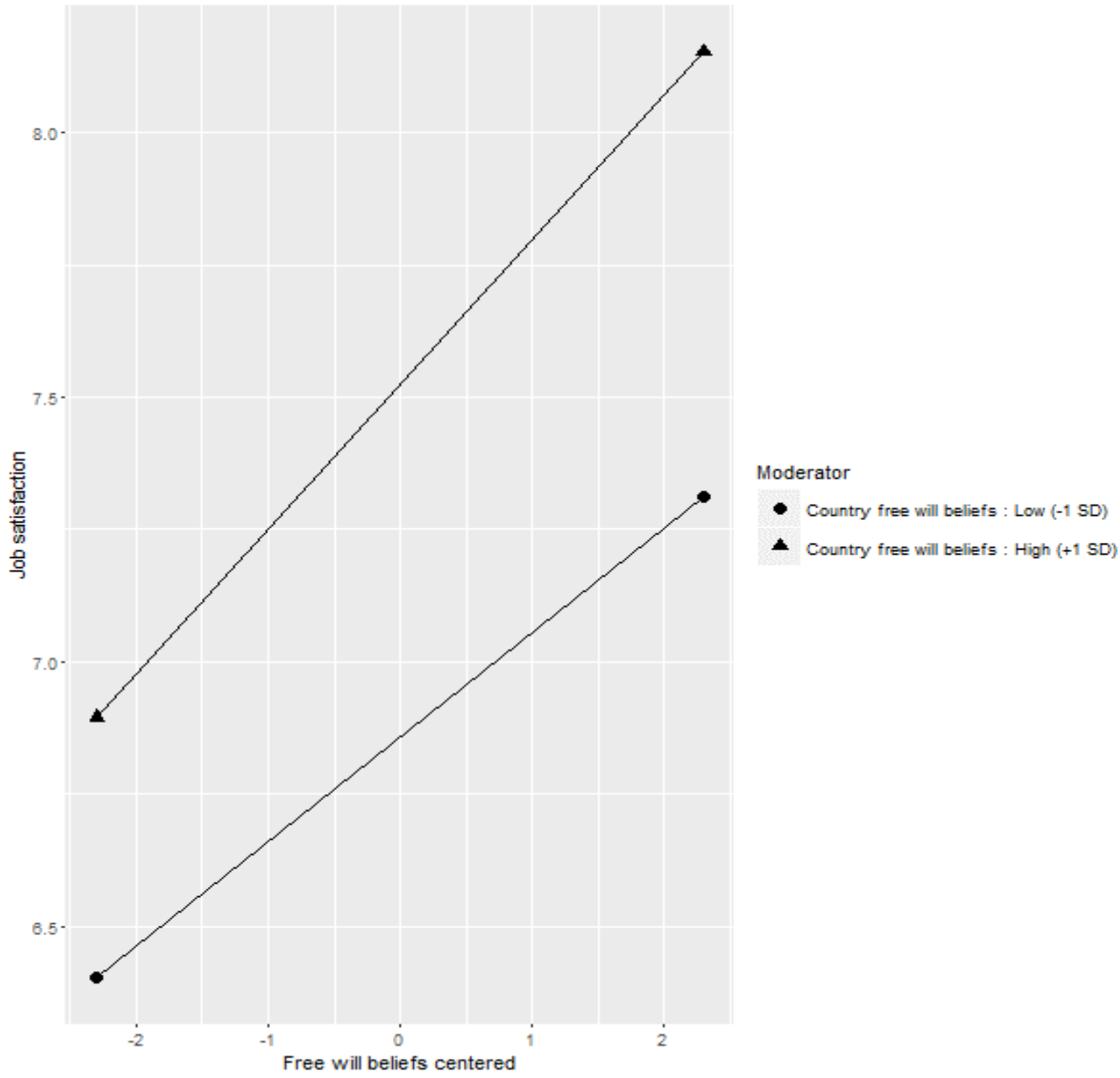


*Figure 1*. Study 3: Plot of the interaction between individual-level and country-level beliefs in free will in predicting job satisfaction. Individual-level beliefs are centered around country-level mean.

# Supplementary materials

## Contents

## Recommended readings regarding free will beliefs

To readers unfamiliar with free will beliefs the related literature we recommend the following article in explaining the importance of the construct and how it differs from other construct in the literature:

Feldman, G. (In press). Making sense of agency: Belief in free will as a unique and important construct. *Social and Personality Psychology Compass, 11 (1), 1-15. doi: 10.1111/spc3.12293* http://onlinelibrary.wiley.com/doi/10.1111/spc3.12293/full (open access)

## Dataset and code

Full data and code were made available on the Open Science Framework (https://osf.io/d2e6s/)

## Power analyses

Previous literature on the relationship between free will beliefs and workplace outcomes (Stillman et al., 2010) has shown an effect of .30 to .33. Power-analysis using G*Power 3.1.92 for single-tail, $\alpha$ = 0.05, power = 0.95 showed required sample size of 111.

Therefore, Study 1 with N = 293/252, Study 2 with 209/137, and Study 3 with N = 14,062 were sufficiently powered to detect power = .95 and alpha=.05 effects.

## Pre-registered hypotheses

The hypothesis that the belief in free will has a positive relationship with job satisfaction and the mechanism of perceived job choice was defended as part of the first author's PhD thesis proposal in November 2013 before the data reported in the manuscript was collected.

## Procedure and data disclosures

### Data collection

In studies 1 and 2, data collection was completed before conducting any analysis of the data. Study 3 is a publicly available data archive.

### Data exclusions

There were no data exclusions.

# Procedure details and materials used in studies

## Study 1

### Translations

To ensure an accurate cross-cultural translation of the scales used we performed the following procedure:

> We followed the standard translation and back translation procedure to do the translation (Brislin, 1970). We first had one PhD student who is proficient in Chinese and English translate the English items into Chinese. We then had a second PhD student who is also proficient in Chinese and English independently translate the translated Chinese items into English (i.e., back translation). The second author of the paper then compared the two English versions (the original versus the back translated version) to see if there is any discrepancy. He then identified the reasons and made a minor adjustment to the Chinese translation. After the adjustment, the translated Chinese items were then sent to a senior researcher in Taiwan who is familiar with the sample respondents in Taiwan. The purpose of this additional review was to ensure that the final Chinese version of the scale was easy to understand (i.e., high readability) for the survey respondents in real-life context. Through this meticulous procedure, we ensured that the Chinese items of the free will beliefs scale were not only accurately translated but also highly readable to the survey respondents.

### Additional procedure details

The participants completed the surveys in their own time and returned them in sealed envelopes via the senior executive assistants, in exchange for coupons. Participants were informed that responses are kept strictly confidential and assured that the company would not have access to their responses.

### Free will scale

The personal will 8-item subscale of the personal will FWD scale (Rakos, Steyer, Skala, & Slane, 2008; see materials in Study 2) was translated to Chinese

The original items (1 = *Strongly disagree*; 6 = *Strongly agree)*:

1. I am in charge of the decisions I make.
2. I actively choose what to do from among the options I have.
3. I am in charge of my actions even when my life's circumstances are difficult.
4. My decisions are influenced by a higher power. (R)
5. I have free will even when my choices are limited by external circumstances.
6. I decide what action to take in a particular situation.
7. My choices are limited because they fit into a larger plan. (R)
8. I have free will.

Items translated to Chinese (Time1: A11-A18):

1. 我對我所 作的決定負責
2. 我自主地 從我有的選項中，選擇要做的事
3. 即使我的 生活環境出現困難，我仍負責決定自己的行動
4. 我的決定 被一些比我高的力量**所影響**
5. 即使我的 選擇被外在環境控制，我仍有自由意志

6. 我決定應 該在甚麼場合做甚麼事
7. 我的選擇受到限制，因為它們須配合一個更大的計劃
8. 我有自由 意志

### Job performance scale

The Dubinsky and Hartley (1986) three-item job performance scale was translated to Chinese:

The original items (1 = Strongly disagree; 5 = Strongly agree):

1. Generally speaking, I am very satisfied with my job
2. I am generally satisfied with the feeling of worthwhile accomplishment I get from doing this job
3. I am satisfied with the kind of work I do in this job

Translated items (Time1:G124-G126; Time2: W2E870- W2E89):

1. 一般來說，我對我的工作滿意。
2. 整體來說，我的工作很棒 。
3. 一般來說，我對所從事的這些工作滿意。

## Study 2

### Free will scale

The 9-item personal agency and free will subscales of FWD scale (Rakos et al., 2008):

1. I have free will
2. Free will is a part of the human spirit
3. Free will is a basic part of human nature
4. I have free will even when my choices are limited by external circumstances
5. People have free will regardless of wealth or life circumstances
6. Life's experiences cannot eliminate a person's free will
7. I am in charge of the decisions I make
8. I decide what action to take in a particular situation
9. I am in charge of my actions even when my life's circumstances are difficult

Scale: 1 – Strongly disagree; 6 – Strongly agree.

#### *The full Rakos et al. (2008) scale with subscales by topic*

<u>Free will</u>

1. Free will is a part of the human spirit
2. Free will is a basic part of human nature
3. I have free will even when my choices are limited by external circumstances
4. People have free will regardless of wealth or life circumstances
5. Life's experiences cannot eliminate a person's free will

<u>Personal Agency</u>

1. I am in charge of the decisions I make
2. I decide what action to take in a particular situation

3. I am in charge of my actions even when my life's circumstances are difficult
4. I have free will

Moral responsibility

1. A person who makes a poor decision should experience the consequences of that decision
2. A person is accountable for the decisions he or she makes
3. A person should receive appropriate punishment for choosing to engage in bad or harmful behaviors
4. A person always has choices and therefore should be punished for making choices that harm others
5. Human beings actively choose their actions and are responsible for the consequences of those actions
6. A person is responsible for his or her actions even if his or her childhood has been difficult

Personal Responsibility

1. A person is to blame for making bad choices
2. A person must accept responsibility for his or her choice of action

Higher Power Control

1. A person's choices are limited by a higher power's plan for him or her
2. Each person's decisions are guided by a larger plan
3. I actively choose what to do from among the options I have

Personal Limitations

1. My decisions are influenced by a higher power
2. My choices are limited because they fit into a larger plan

Scale: 1 – Strongly disagree; 6 – Strongly agree.

*The full Rakos et al. (2008) scale with subscales by personal-general categories*

General Will Questions

1. Each person's decisions are guided by a larger plan. (R)
2. Human beings actively choose their actions and are responsible for the consequences of those actions
3. Free will is a basic part of human nature.
4. A person must accept responsibility for his or her choice of action.
5. Life's experiences cannot eliminate a person's free will.
6. A person is to blame for making bad choices.
7. A person should receive appropriate punishment for choosing to engage in bad or harmful behaviors.
8. A person who makes a poor decision should experience the consequences of that decision.
9. People have free will regardless of wealth or life circumstances.
10. A person's choices are limited by a higher power's plan for him or her. (R)
11. A person is accountable for the decisions he or she makes.
12. Free will is part of the human spirit.
13. A person is responsible for his or her actions even if his or her childhood has been difficult.
14. A person always has choices and therefore should be punished for making choices that harm others.

Personal Will Questions (collected in Study 1)

1. I am in charge of the decisions I make.
2. I actively choose what to do from among the options I have.
3. I am in charge of my actions even when my life's circumstances are difficult.
4. My decisions are influenced by a higher power. (R)

5. I have free will even when my choices are limited by external circumstances.
6. I decide what action to take in a particular situation.
7. My choices are limited because they fit into a larger plan. (R)
8. I have free will.

Scale: 1 – Strongly disagree; 6 – Strongly agree.

### Job satisfaction scale

Job satisfaction five items short scale version of Brayfield and Rothe (1951) constructed by Judge, Locke, Durham, and Kluger (1998:

1. I feel fairly well satisfied with my present job doing MTurk tasks
2. Most days I am enthusiastic about the work I do on MTurk
3. Every time I work on tasks on MTurk it feels like forever (reversed)
4. I find real enjoyment in the work I do on MTurk
5. I consider the kind of work I do on MTurk rather unpleasant (reversed)

Scale: 1 – Strongly disagree; 7 – Strongly agree.

### Job autonomy scale

1. I have significant autonomy in determining how I do my job on MTurk
2. I can decide on my own how to go about doing my work on MTurk
3. I have considerable opportunity for independence and freedom in how I do my job on MTurk

Scale: 1 – Strongly disagree; 7 – Strongly agree.

### Controls

#### *Self-Control Scale*

(Tangney, Baumeister, & Boone, 2004)

1. I am good at resisting temptation.
2. I have a hard time breaking bad habits. (R)
3. I am lazy. (R)
4. I say inappropriate things. (R)
5. I do certain things that are bad for me, if they are fun. (R)
6. I refuse things that are bad for me.
7. I wish I had more self-discipline. (R)
8. People would say that I have iron self- discipline.
9. Pleasure and fun sometimes keep me from getting work done. (R)
10. I have trouble concentrating.(R)
11. I am able to work effectively toward long-term goals.
12. Sometimes I can't stop myself from doing something, even if I know it is wrong. (R)
13. I often act without thinking through all the alternatives. (R)

Scale: 1 – Not at all; 5 – Very much.

#### *Locus of Control - Rotter (1966)*

Please choose one choice (a or b) for each:

1.
    a. Children get into trouble because their patents punish them too much.
    b. The trouble with most children nowadays is that their parents are too easy with them.

2.
   a. Many of the unhappy things in people's lives are partly due to bad luck.
   b. People's misfortunes result from the mistakes they make.
3.
   a. One of the major reasons why we have wars is because people don't take enough interest in politics.
   b. There will always be wars, no matter how hard people try to prevent them.
4.
   a. In the long run people get the respect they deserve in this world.
   b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
5.
   a. The idea that teachers are unfair to students is nonsense.
   b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
6.
   a. Without the right breaks, one cannot be an effective leader.
   b. Capable people who fail to become leaders have not taken advantage of their opportunities.
7.
   a. No matter how hard you try, some people just don't like you.
   b. People who can't get others to like them don't understand how to get along with others.
8.
   a. Heredity plays the major role in determining one's personality.
   b. It is one's experiences in life which determine what they're like.
9.
   a. I have often found that what is going to happen will happen.
   b. Trusting fate has never turned out as well for me as making a decision to take a definite course of action.
10.
   a. In the case of the well prepared student there is rarely, if ever, such a thing as an unfair test.
   b. Many times, exam questions tend to be so unrelated to course work that studying is really useless.
11.
   a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
   b. Getting a good job depends mainly on being in the right place at the right time.
12.
   a. The average citizen can have an influence in government decisions.
   b. This world is run by the few people in power, and there is not much the little guy can do about it.
13.
   a. When I make plans, I am almost certain that I can make them work.
   b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

Score one point for response ‘a’ to questions: 1, 3, 4, 5, 10, 11, 12, and 13.

Score one point for response ‘b’ to questions: 2, 6, 7, 8, and 9.

*Self-esteem - Rosenberg (1965)*

1. I feel that I am a person of worth, at least on an equal basis with others.
2. I feel that I have a number of good qualities.
3. All in all, I am inclined to feel that I am a failure. (R)
4. I am able to do things as well as most other people.
5. I feel that I do not have much to be proud of. (R)
6. I take a positive attitude toward myself.
7. On the whole, I am satisfied with myself.
8. I wish I could have more respect for myself. (R)
9. I certainly feel useless at times. (R)
10. At times I think I am no good at all. (R)

Scale: 1 – Strongly disagree; 7 – Strongly agree.

*Self-efficacy – Judge et al. (1998)*

1. I am strong enough to overcome life's struggles.
2. At root, I am a weak person. (R)
3. I can handle the situations that life brings.
4. I usually feel that I am an unsuccessful person. (R)
5. I often feel that there is nothing that I can do well. (R)
6. I feel competent to deal effectively with the real world.
7. I often feel like a failure. (R)
8. I usually feel I can handle the typical problems that come up in life.

Scale: 1 – Strongly disagree; 7 – Strongly agree.

*Implicit beliefs - Dweck (2000)*

1. The kind of person someone is, is something very basic about them, and it can't be changed very much.
2. People can do things differently, but the important parts of who they are can't really be changed.
3. Everyone is a certain kind of person, and there is not much that they can do to really change that.
4. As much as I hate to admit it, you can't teach an old dog new tricks. People can't really change their deepest attributes.
5. Everyone, no matter who they are, can significantly change their basic characteristics. (R)
6. People can substantially change the kind of person they are. (R)
7. No matter what kind of person someone is, they can always change very much. (R)
8. People can change even their most basic qualities. (R)

Scale: 1 – Strongly disagree; 7 – Strongly agree.

## Correlations between free will subscales and job satisfaction

The findings replicated using the entire scale, yet we believe that the agency and free will subscales were the most accurate representation of free will beliefs across cultures. In the manuscript we report findings using the agency and free will subscales which are conceptually the closest to capturing free will beliefs. Following our experience with Study 1 we anticipated and found that the

"higher power control" and "personal limitations" subscales would pose a challenge in cross-cultural contexts, since in western protestant cultures the belief in free will is closely associated with religious belief (but not so in the Taiwanese sample in Study 1).

Below, we report correlations for the entire scale as well as the other subscales.

| | Job satisfaction T1 | Job satisfaction T2 |
|---|---|---|
| FW T1 Agency and free will subscales | .31** | .31** |
| FW T1 All subscales combined | .28** | .19* |
| FW T1 Free will subscale | .26** | .28** |
| FW T1 Personal agency subscale | .32** | .29** |
| FW T1 Moral responsibility subscale | .30** | .30** |
| FW T1 Higher power control subscale (R) | -.01 | -.22* |
| FW T1 Personal responsibility subscale | .28** | .27** |
| FW T1 Personal limitations subscale (R) | .02 | -.21* |
| FW T1 - Personal | .26** | .12 |
| FW T1 - General | .26** | .20* |

## Study 3

### Measures

The following items were used in the WVS:

- A173: "Indicate how much freedom of choice and control you feel you have over the way your life turns out" (1 = no choice and control to 10 = a great deal of choice and control).
- c033: "Overall, how satisfied or dissatisfied are you with your job?" (1 = Dissatisfied to 10 = Satisfied).
- c034: "How free are you to make decisions in your job?" (1 = None at all to 10 = A great deal)

# Clarifications and additional analyses

## Free-will beliefs scale use across studies

### Choice of Rakos et al. (2008)

We chose the Rakos et al. (2008) for the following reasons:

1. The Paulhus-Carey makes broad statements about free will in general. For example, the first item is "People have complete control over the decisions they make", with people referring to all humans. The Rakos et al. (2008) includes two subscales, one looking at free will in general and one examining free will in reference to the self. For example, the personal equivalent to the item from Paulhus-Carey above is "I am in charge of the decisions I make" in the personal agency subscale included in both Studies 1 and 2. Since job satisfaction is basically about one's own satisfaction, then we expected that a measure examining free-will beliefs for the self would more accurately capture the elements in the free will beliefs that pertain to possible positive outcomes.
   In Study 1, we needed a short measure that would fit time-sensitive data collection in the field and therefore decided to go with Rakos et al.'s personal free-will subscale. In Study 2 we could run longer scales with the MTurk platform and therefore decided to include the whole scale, which includes the personal subscale, which would allow us for fuller reporting, which we included in the supplementary.

2. The Paulhus-Carey did not differentiate free-will related items with moral-responsibility related items, while the Rakos et al. measure did. We could have made that separation in the Paulhus-Carey scale ourselves, but that would have raised issues.

### Use of Rakos et al. (2008)

Rakos et al. (2008) uses two categorizations into subscales that refer to the same items. The first categorization is the personal-general categorization, and in Study 1 we used the personal free-will subscale. The second categorization is divided into the following subscales - Moral responsibility, free will, personal agency, higher power control, personal responsibility, and personal limitations. The shared 22-items are split differently between these two categorizations, and the details are provided above in the materials section. Importantly, the "personal free-will subscale" used in Study 1 includes all the items from the "personal agency subscale" and other items from "free will subscale", "higher power control" and "personal limitations" subscales" that refer to the self.

Study 1 only measured the personal free will subscale using 8-items due to data collection constraints. Study 2 measured the entire Rakos et al. (2008) scale.

### Consistency across studies in Rakos et al. (2008)

The findings regarding the use of "personal agency" in both Study 1 and Study 2 were consistent and significant:

1. In Study 1, the "personal agency" subscale was significantly related to job satisfaction in both Time 1 ($r = .27$) and Time 2 ($r = .18$).

2. In Study 2, the personal agency subscale was significantly related to job satisfaction in both Time 1 ($r = .32$) and Time 2 ($r = .29$).

The correlations for the other subscales are reported above under Study 2.

### Change in subscales used between Study 1 and Study 2

We anticipated problems with the items pertaining to religion (higher power) and moral responsibility, and indeed found issues with the items regarding religion. To give an example for such differences, in Taiwan the prevalent religion is Daoism-Buddhism accepting many deities (Polytheism) and does not restrict individuals to a particular God, type of worship, or lifestyle, while Americans mainly believe in Christianity, most of them Protestant, which is more restrictive in which God one should follow and in what way. In our other studies conducted in both Hong Kong/China/Taiwan/Singapore and the US, we indeed found significant differences on these items.

## Controlling for demographics

### Study 1

| | Belief in free will (T1) | Job satisfaction (T1) | Job satisfaction (T2) |
|---|---|---|---|
| Belief in free will (T1) | (.74) | .36*** | .18** |
| Job satisfaction (T1) | .36*** | (.95) | .42** |
| Job satisfaction (T2) | .19** | .43*** | (.93) |
| Age | .10 | .08 | -.09 |
| Gender | .11 | .11 | .17** |

*Note*. Alpha coefficients are presented on the diagonal. Values under the diagonal are two-tail correlations, values above the diagonal are partial correlations controlling for age and gender (T1); T1 = Collected in Time 1, T2 = collected in Time 2. * $p < .05$, ** $p < .01$, *** $p < .001$. Gender is coded as 0 = Male, 1 = Female.

### Study 2

| | Belief in free will (T1) | Job satisfaction (T1) | Job satisfaction (T2) |
|---|---|---|---|
| Belief in free will (T1) | (.88) | .28*** | .28** |
| Job satisfaction (T1) | .31*** | (.79) | .71*** |
| Job satisfaction (T2) | .31*** | .73*** | (.84) |
| Age | .15* | .13 | .10 |
| Gender | .16* | .21** | .25** |

Alpha coefficients are presented on the diagonal. Values under the diagonal are two-tail correlations, values above the diagonal are partial correlations controlling for age and gender (T1); T1 = Collected in Time 1, T2 = collected in Time 2; Reliability alpha coefficients are presented on the diagonal. * $p < .05$, ** $p < .01$, *** $p < .001$. Gender is coded as 0 = Male, 1 = Female.

Study 3

| | Belief in free will | Job satisfaction |
|---|---|---|
| Belief in free will | - | .23 |
| Job satisfaction | .22 | - |
| Age | -.04 | .02 (p = .067) |
| Gender | -.02 | .13 |

*Note*. N = 14,062. Due to the large sample size, all correlations were significant $p < .001$, otherwise flagged. Values under the diagonal are two-tail correlations, values above the diagonal are partial correlations controlling for age and gender

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