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Folk Conceptions of Free Will: A Systematic Review and Narrative Synthesis of Psychological Research

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The existence of free will has been a subject of fierce academic debate for millennia, still the meaning of the term "free will" remains nebulous. In the past two decades, psychologists have made considerable progress in defining lay concepts of free will. We present the first systematic review of primary psychological evidence on how ordinary folk conceptualise free will, encompassing folk concepts, beliefs, intuitions, and attitudes about free will. A total of 1,384 records were identified following a preregistered protocol. After abstract and full-text screening, 18 articles published from 2008 to 2020 were eligible for inclusion, comprised of 36 studies and 10,176 participants from regions including the United States, Singapore, Hong Kong, India, Turkey, and Germany. A narrative synthesis of results showed that for ordinary folk, especially the more educated population from the United States, free will is a dynamic construct centred on the ability to choose following one's goals and desires, whilst being uncoerced and reasonably free from constraints. Results suggesting metaphysical considerations regarding consciousness, dualism, and determinism were inconclusive. Our findings provided preliminary support for a psychological model of folk conception of free will, and elucidated potential pathways mediating the effects of consciousness and dualism on free will attributions. Further research is needed to explicate the distinction between having free will and having the ability to exercise free will, as well as the cross-cultural generalizability and differences of findings on folk conceptions of free will.

Keywords: free will, choice, folk concepts, lay beliefs, systematic review, open science

Introduction

What is free will, and what does it mean to have free will? As psychologists, how can we contribute to the dialogue about free will? It has been said that asking psychologists about free will is like asking zoologists about unicorns (Prinz and Klohr, 2007). Yet, this elusive creature has attracted widespread attention in the field of psychology in the past decade, and psychological research on folk concepts, beliefs, and intuitions about free will is rapidly growing (Feldman, 2017; Monroe et al., 2014; Wisniewski et al., 2019). Social and cognitive psychologists have made considerable progress in defining folk conceptions of free will, exploring behavioural consequences of free will beliefs, and uncovering cognitive processes involved in the perception of free will (Feldman, 2017; Feldman and Chandrashekar, 2018). These discoveries provided new and illuminating insights into the perplexing problem of free will, beyond the age-old philosophical debate over the unicorn's existence.

Indeed, this unicorn called free will was a creature conceived by the human collective (Prinz and Klohr, 2007). Research has shown that belief in free will is widespread across cultures from East to West (Sarkissian et al., 2010). Studies using psychometric scales measuring free will beliefs indicated that most laypeople strongly endorse the existence of free will (Nadelhoffer et al., 2014; Paulhus and Carey, 2011; Rakos et al., 2008), as affirmed by descriptive research (Monroe and Malle, 2010; Monroe and Malle, 2014) and a literature review of past evidence (Baumeister et al., 2011). Free will is a vital part of the human experience (Baumeister and Monroe, 2014), and the pervasive belief in free will has been suggested to be an artefact of adaptive human evolution that enhances self-regulation (Rakos, 2004). Experimental research found young children aged four to six are already developing adult-like intuitions about free will, that themselves and others can have the ability to choose otherwise in unconstrained situations (Kushnir et al., 2015). A review of evidence from animal research, neuroimaging and clinical studies suggested that human's and animal's need for control through choosing may be a biological necessity for survival (Leotti et al., 2010).

The folk psychological concepts of free will, free choice, and voluntary action lie close to the heart of autonomy, moral responsibility, ethics, and law (Ewusi-Boisvert and Racine, 2018; Guglielmo et al., 2009; Racine, 2017). Belief and disbelief in free will have behavioural consequences that affect both the individual and the wider society. Whereas a high belief in free will could bring prosocial benefits (Baumeister and Brewer, 2012) and enable individuals to pursue self-directed goals (Feldman and Chandrashekar, 2018), a reduced belief in free will could diminish an individual's sense of agency and moral responsibility (Ewusi-Boisvert and Racine, 2018). Although more research and replications are needed to establish a causal relationship between free will beliefs and positive life outcomes, it is evident that free will beliefs have far-reaching implications ranging from societal to neurological (Baumeister and Monroe, 2014). For these reasons, findings about folk beliefs and endorsement of free will from past studies should be thoroughly reviewed.

The prime purpose of this systematic review is to synthesise the existing body of psychological literature and provide a comprehensive and balanced account of folk conceptions of free will, including conceptualisation, beliefs, intuitions, and attitudes about free will. This is a pre-registered systematic review, with open methods and open data to ensure transparency and reproducibility.

The Free Will Debate

The existence of free will is a controversial philosophical question that has remained unresolved for millennia, and it is arguably amongst the hardest and most important intellectual problems (Dennett, 2008). Psychologists have debated over mental causation, that is, whether actions are caused by conscious processes, for over a century (Bargh, 2013)[1]. The argument about the causal link between volition and action has become increasingly heated within the field of brain sciences due to the popularisation of the claim that free will is illusory, which has been censured as "at best beside the point and at worst absurd" (Shariff et al., 2008, p.182). This supposition has been termed willusionism, and its proponents willusionists (Nahmias, 2011). As Brass et al. (2019) pointed out, willusionists typically argue that because Libet-style experiments (Libet et al., 1983) demonstrated that a specific cerebral activity called readiness potential precedes the conscious intention to act by a few hundred milliseconds, the perception of freely willed action is illusory.

On willusionist claims, Dennett (2003) argued that taking scientific evidence that free will does not operate in certain ways as the proof that free will doesn't exist at all is like taking the existence of Cupid being disproven as the idea of falling in love being disproven as well. Whether the results of Libet experiments can indicate free will exists or not depends on what ordinary folk think free will is (Nahmias, 2011). These studies of volition have been criticised for being overly focused on slicing behaviour into milliseconds (Baumeister, 2008) in inconsequential, arbitrary decision-making tasks (Mudrik et al., 2020; Tse, 2013), and overlooking the phenomenology of sense of agency (Haggard and Chambon, 2012).

Recent advances in neuroscience have allowed for further scientific exploration of the existence of free will (Mudrik et al., 2020), and neuroscientists have proposed that free will could have a neural basis and is not an illusion (e.g. Brass et al., 2019; de Jong, 2019; Tse, 2013). If humans are indeed, as philosopher Jean-Paul Sartre (1972) asserted, "not free to cease being free" (p. 439), then whether the folk believe in free will or not, and whether people act as though they have free will or not may be important in understanding biases, judgments, and decisions (Feldman, 2017). Psychologists and philosophers have cautioned against making claims that free will does not exist with seemingly scientific grounds, as disbelief in free will may induce a sense of fatalism insinuating that people lack the power to control their lives, and may encourage immoral behaviour that is detrimental to not only the individual but also the wider society (Baumeister et al., 2011; Bergner, 2018; Dennett, 2008; Mele, 2014; Nahmias, 2011; Shariff et al., 2008). Importantly, folk conceptions about free will matter in shaping cognitions, judgments and behaviors, outcomes with potential societal implications across cultures that psychologists like to investigate (Duan et al., 2024; Feldman, 2017).

Folk Conceptions of Free Will in Psychology

Alfred Mele, the director of the Big Questions in Free Will Project, asked some scientists from the willusionist camp why free will does not exist, "Here's a short answer: because they set the bar for free will ridiculously high ..... the higher one sets the bar, the more likely one is to see free will as an illusion" (2014, p. 88). What about folk conceptions of free will? Is the bar for free will set just as high?

[1]While psychologists' understanding of mental causation is mostly regarding consciousness versus unconsciousness (Bargh, 2013), as emphasized by Sofia Jeppsson (one of the reviewers), philosophers generally focus on whether or how mental events may have physical effects, but not consciousness versus unconsciousness. We thank Sofia Jeppsson for suggesting us to add this footnote.

An overview of free will research by Baumeister and Monroe (2014) suggested that free will is generally conceptualised as the ability to make conscious and uncoerced choices. For ordinary people, free will invokes ideas and feelings about making choices (Feldman et al., 2014). Free will is recognised as the capacity for unconstrained decision-making, not necessarily involving metaphysical considerations such as the existence of a soul (Monroe et al., 2014; Monroe and Malle, 2010; Monroe and Malle, 2014; Vonasch et al., 2018). People also tend to associate consciousness with free choice (Shepherd, 2012), a linkage that has been assumed by various scholars (e.g. Baumeister, 2008; Rakos, 2004; Sartre, 1972; Wegner, 2002) as the foundation for the phenomenology of free will. Whether people think free will is a condition for moral responsibility has been a subject of debate (Monroe et al., 2014). Whilst it has been suggested that the desire to uphold moral responsibility is what motivates the folk to believe in free will (Clark, 2014; Clark et al., 2019), replication attempts yielded no consistent results to support this assertion (Monroe and Ysidron, 2020). Further disagreement persists on whether the folk concept of free will is compatible with determinism, meaning if people can have free will if the world is deterministic (compatibilism) or if people cannot have free will if the world is deterministic (incompatibilism) (Deery et al., 2015)[2]. Regardless, this debate is more relevant to philosophers than psychologists (Baumeister and Monroe, 2014).

Monroe and Malle (2014) delineated two models to encompass folk conceptions of free will: a psychological model, and a metaphysical model[3]. Under the psychological model, free will is about making free choices that fulfil one's desire, without internal or external constraints. In contrast, the metaphysical model invokes the notion of dualism, requiring a soul that is the "uncaused cause" of choices and actions. Preliminary evidence (e.g. Monroe et al., 2014; Monroe and Malle, 2010; Monroe and Malle, 2014; Vonasch et al., 2017) suggested that the folk concept of free will is in line with the psychological model; this systematic review will further enquire into how the wider literature fits into the theoretical framework.

In scientific literature, free will has been operationalised as free actions (Baumeister, 2008; Baumeister et al., 2011), intentional control (Rigoni et al., 2013), volitional action control, and responsible autonomy (Baumeister and Monroe, 2014), involving processes such as self-regulation, conscious and rational decisions-making, as well as behavioural plasticity (Baumeister, 2008). The concept of free will appears to be dynamic and responsive to priming or societal events (Ewusi-Boisvert and Racine, 2018; Racine, 2017; Seto, 2024), and many studies on the consequences of free will belief relied on experimental manipulations to enhance or reduce the belief in free will to establish causation. However, a recent meta-analysis suggested that whilst free will beliefs could be experimental manipulated, there was scant evidence for downstream consequences (Genschow, Cracco, et al., 2021), and the longitudinal effects remain unknown (for a critical review, see Ewusi-Boisvert and Racine, 2018).

Psychologists began to look into folk conceptions of free will in the last decade, adopting priming techniques to manipulate free will beliefs, scales such as the Free Will and Determinism Scale (FWD; Rakos et al., 2008) and Free Will and Determinism Plus Scale (FAD+; Paulhus and Carey, 2011) to measure individual differences in free will beliefs, with a focus on behavioural and cognitive consequences (Feldman and Chandrashekar, 2018). The most direct investigations into folk concepts of free will asked laypersons to define free will and free will related actions using open-ended questions and coding of response (Monroe and Malle, 2010; Monroe and Malle, 2014; Stillman et al., 2011). Recent studies (e.g. Clark et al., 2019; Feldman and Chandrashekar, 2018; Fillon et al., 2019) also adopted vignette experiments from the classic experimental philosophy paradigm (e.g. Nichols, 2004; Nichols and Knobe, 2007), which typically describe a hypothetical, fatalistic, deterministic or indeterministic universe to probe folk intuitions about free will in relation to determinism and moral responsibility.

Consequences of Free Will Beliefs

Recent evidence indicated that people with greater belief in free will gain greater life satisfaction (Crescioni et al., 2016; Li et al., 2017) and positive affect (Kondratowicz-Nowak and Zawadzka, 2018; Li et al., 2017), higher job satisfaction (Feldman et al., 2018), better job performance (Stillman et al., 2010) and academic performance (Feldman et al., 2016). On the other hand, research indicated that individuals who disbelieve in free will were more likely to conform (Alquist et al., 2013) and less willing to help others (Baumeister et al., 2009).

Free will beliefs also have cognitive consequences. Whereas a weakened belief in free will could reduce

[2]We thank Sofia Jeppsson, a peer reviewer, for the suggestion on clarifying regarding this issue.

[3]As discussed by one of the peer reviewers (Sofia Jeppsson), there are additional positions about free will. For example, many Singaporeans believe in both immaterial souls and determinism (see 2019). This is in line with philosophers' beliefs that physical vs non-physical and determinism (or not) can be two distinctions.

self-control (Rigoni et al., 2012), cognitive control and action monitoring (Rigoni et al., 2013), and even alter neurological correlates of voluntary motor preparation (Rigoni et al., 2011), a stronger belief in free will is correlated with greater perceived meaning in life (Crescioni et al., 2016), higher perceived capacity for decision- making (Feldman et al., 2014), reduced indecisiveness (Kokkoris et al., 2019), higher self- efficacy (Crescioni et al., 2016), more gratitude (Crescioni et al., 2016; MacKenzie et al., 2014), and greater self and upward counterfactual thinking, which are beneficial for learning (Alquist et al., 2015). Manipulation of free will belief could influence the sense of agency (Rigoni et al., 2012), which diminishes under coercion (Caspar et al., 2016; Caspar et al., 2018). In relation to moral responsibility, free will beliefs affect judgements about the behaviour of others (Genschow et al., 2017), and a weakened belief in free will could reduce support for retributive punishment (Shariff et al., 2014). Granted, having a belief in free will could also have negative implications. People who endorse free will were more likely to blame victims for their own sufferings (Genschow and Vehlow, 2021), attribute blame on others for being obese and having a mental illness like schizophrenia (Chandrashekar, 2020), and perceive self to be less susceptible to biases and personal shortcomings compared to others (Chandrashekar et al., 2021).

The Present Paper

Given free will conceptions may be associated with well-being, judgments and behaviors, free will is far more than a philosophical notion, and psychologists have much to contribute to the scholarly pursuit of this unicorn called free will, especially in answering the key question of this systematic review - how do ordinary folk conceptualise free will, without needing to take a scientific stance on its existence (Baumeister and Monroe, 2014). As recommended by experimental philosophers, the methods of empirical psychology are best suited to map folk intuitions about free will (Nahmias et al., 2007), and unearth the contents and perhaps the purpose of the idea of free will (Baumeister and Monroe, 2014). From a psychological perspective, free will belief is conceptually distinct from other constructs of agency such as traits locus of control, self-efficacy, self-esteem, and self-control, as well as lay beliefs such as implicit theories, mind-body dualism, intentionality, and autonomy; free will belief is a unique facet of individual differences with its own psychological significance that warrants investigation (Baumeister and Monroe, 2014; Feldman, 2017).

The folk concept of free will matters, for it structures people's subjective experience of volition and morality and shapes how people make judgments, interact and behave, which are outcome variables that are interesting for psychologists and potentially consequential for the society (Duan et al., 2024; Monroe and Malle, 2014; Shariff et al., 2008)[4]. Although laypeople may not have a sophisticated understanding of free will (Baumeister and Brewer, 2012), the reality of the folk beliefs and intuitions about free will should be based on empirical investigation, not simply the estimate by academics from armchairs (Guglielmo et al., 2009; Monroe and Malle, 2010).

To this date, only literature reviews (e.g. Baumeister and Brewer, 2012; Baumeister et al., 2011; Baumeister and Monroe, 2014; Ewusi-Boisvert and Racine, 2018; Feldman, 2017; Hodge et al., 2020; St Quinton et al., 2023) were available on folk concepts of free will, all of which emphasised the correlates and consequences of free will beliefs. The growing body of literature from the past decades has yet to be reviewed systematically. There are wide and continuing disagreements over the meaning of free will (Baumeister and Brewer, 2012; Monroe et al., 2014), which created great confusion about the implications of free will research (Baumeister and Monroe, 2014). It remains unclear whether the definitions of free will in scientific investigations were in accord with lay people's conception of the construct, and scholars can make progress by moving away from academic and philosophical interpretations and towards a clearer understanding of the folk's conceptualisation of free will (Baumeister and Monroe, 2014; Monroe and Malle, 2014).

This systematic review aimed to address this research gap by synthesising knowledge from a wide range of psychological studies on folk conceptions of free will, and provide a grounded understanding of this possibly universal construct as a meta-assumption (Sappington, 1990) to guide future research. Since there is little empirical investigation centred on folk definitions of free will (Baumeister and Monroe, 2014; Monroe and Malle, 2014; Rakos et al., 2008), this systematic review enquired into a broader research area, the folk conceptions of free will, to encompass folk concepts, beliefs, intuitions, and attitudes about free will. Research methodology was critically reviewed, giving special attention to Constraints on Generality (Simons et al., 2017), in particular, the representativeness of samples and generalisability of findings across cultures, as well as the reproducibility of results (Siddaway et al., 2019). The findings were discussed within the framework of the psychological and metaphysical models of

[4]We thank the reviewer Prasad Chandrashekar for the suggestion in clarifying the importance of studying free will conceptions of laypeople.

free will by Monroe and Malle (2010, 2014) to bridge theoretical gaps.

Methods

This systematic review follows the Non-Interventional, Reproducible and Open (NIRO) systematic review guidelines v1 (Topor et al., 2023), which was specifically developed for systematic reviews of research not involving interventions. Commonly adopted guidelines such as Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher et al., 2009; Page et al., 2021) and Cochrane Reviews (Higgins et al., 2019) were intended for interventional research, and would not apply to this project. The procedure of this systematic review was based on the best practice guide by Siddaway et al. (2019).

The protocol for this systematic review was pre-registered on Open Science Framework (OSF) on August 21, 2020. There were several amendments to the protocol since the initial pre-registration, with the protocol updated on September 19, 2020 (Version 2) and October 22, 2020 (Version 3) respectively. All versions of the protocol are available on OSF, with details on all changes (see Appendix A). Protocol pre-registration prior to conducting a systematic review is recommended as a best practice to prevent review duplication, minimise reviewer biases and questionable research practices, which increase the reliability and rigour of the research synthesis (Siddaway et al., 2019). In support of open science and research transparency, all database search results, abstract and full-text screening coding sheets, and extracted data were also made publicly available at OSF: https://doi.org/10.17605/OSF.IO/2T67Z

Ethics was approved via expedited approval by the University of Liverpool Psychology Virtual Programme Research Ethics Committee on July 22, 2020.

Search Strategy

The literature search was conducted on the databases APA PsycInfo, Scopus, Web of Science, OpenDissertations, ProQuest Dissertations and Theses Global on August 27, 2020, and rerun on October 22, 2020, to check for new publications. The databases were selected based on their relevance to the research subject, and a consultation with a librarian specialised in behavioural sciences and systematic reviews (M. Testerman, personal communication, July 28–29, 2020). All databases were accessed through the University of Liverpool Library. All database search results were exported as .ris, .xls, and .ciw files and available on OSF.

Considering that this is the first systematic review on the subject and the search should be as comprehensive as possible, the literature search applied to all articles, including those without full-text or peer review, and no time limiter was applied. As the commission of an external translator was not possible for this dissertation, only English studies were included. To minimise the effect of publication bias, which could pose a substantial threat to the validity of conclusions drawn in a systematic review (Siddaway et al., 2019; Topor et al., 2023), grey literature including dissertations, theses, conference presentations, pre-prints, and unpublished manuscripts were eligible for inclusion. A search for pre-prints was conducted on OSF and PsyArXiv on September 29, 2020.

For all searches, the following Boolean phrase was used: "free will" AND (concept* OR belie* OR intuit* OR perce* OR interp* OR think* OR view* OR feel*) AND (lay* OR ordinary OR folk OR people). The search terms were coined based on the title and abstract of 14 potentially eligible articles, which were all identified in the scoping search results (see "Appendix A" in the protocol), validating the adequacy of the search strategy. An addition keyword ("people") was added to broaden the search after the scoping search, as suggested by M. Testerman (personal communication, July 28, 2020). The full search query used in each database is shown in Table 1.

Screening

EndNote X9.9.3 was used as the reference manager for the search results and duplicate removal. ASReview version 0.9.6 (https://asreview.nl/), an open-source machine learning programme, was used for abstract screening. ASReview uses active learning to help improve screening efficiency (van de Schoot et al., 2021), and thereby minimise potential screening errors arisen from not having two separate reviewers to perform literature search and selection, which would have been the best practice for systematic reviews (Siddaway et al., 2019), but not feasible due to the dissertation nature of this research. Considering this limitation, all abstract screening decisions generated using ASReivew were also cross-checked and further assigned with an exclusion code in an excel file to ensure transparency and accuracy. After abstract screening, Microsoft Excel was used for documenting full-text screening decisions.

Only one article was inaccessible in the full-text screening stage. The first author was contacted to locate the article, which was provided (see Appendix B).

To avoid reporting bias, inclusion and exclusion criteria were pre-registered in the protocol, and all records were screened accordingly. Eligible articles must sat-

isfy the following inclusion criteria: (1) primary psychological research investigating folk conceptions of free will, including beliefs, intuitions, perceptions, interpretations, thoughts and feelings about free will; and (2) English language. Articles were excluded if they were (1) without original empirical findings; (2) not directly investigating folk conceptions of free will, such as those without an explicit free will measure, or focused on the causes or consequences of free will beliefs; (3) experimental philosophy studies or philosophical thought experiments; or (4) studies that collected data from clinical populations. Importantly, we deviated from Version 1 of the pre-registration protocol and updated the pre-registration protocol in Version 2 to clarify that we exclude experimental philosophy studies and only focus on psychological research studies. This is due to the methodological differences between experimental philosophy studies and psychology studies (Feldman and Chandrashekar, 2018), as experimental philosophy focuses on philosophical problems, for example whether people perceive free will to be compatible with determinism (Nichols, 2011). The reviewer, who was a psychology student at the time, considered experimental philosophy to be beyond her expertise, given the various interpretations and complexity, that require reflective considerations of professional philosopher (Nahmias, 2006). We explain this issue in more details in Appendix A[5].

Data Extraction

All data relevant to the research question were extracted, including title, author(s), year, country, type of publication, name of journal/book, main conclusions, pre-registration, data/code sharing, area(s) of free will conception addressed (e.g. attributions, beliefs, concepts), independent and dependent variable(s), study design, manipulation, instruments, statistical method, main results, statistics, effect sizes (if available), sample characteristics (total and analysed sample sizes, reasons for exclusion, sex, mean age and SD, country, ethnicity, education, political attitude, religiosity, religion, and source of participants), and authors note on limitations to generalisability. All extracted data are available on the online table.

In cases where there was missing data, the first author of the article was contacted via email to retrieve the information. If the first author responded that the data was only available from another author, the other author responsible for the study was contacted. A total of 14 authors were contacted and 12 replied. Ten authors provided supplementary data (see Appendix B), and two authors had no additional data to provide.

Critical Appraisal

There was no validated assessment tool for non-interventional studies as of the time of writing, as earlier confirmed by NIRO project leader J. S. Pickering (personal communication, June 29, 2020). Considering the level of knowledge of the student reviewer, and that there was only one reviewer for this review, adapting an existing tool would not be appropriate. Moreover, an unsuitable or customised tool could not address biases adequately (Health and Council, 2019). Risk of bias and quality assessment has been a contested issue and may not be a requisite for best practice (Siddaway et al., 2019). Assessment tools are still being developed for systematic reviews of non-interventional research (Topor et al., 2023). For the reasons above, risk of bias and quality assessment was not conducted.

Alternatively, this review provided a critical appraisal of research evidence using a narrative approach as per Baumeister and Leary (1997), which is to group studies by methodologies for critique and discuss the consistency of findings. The Constraints on Generality (Simons et al., 2017) of studies were also reviewed, to examine whether the populations sampled were representative of laypeople, the generalisability of materials and procedures used, as well as temporal and cultural specificities of findings.

Synthesis

Since this systematic review was exploratory and included both quantitative and qualitative research, the studies included were diverse in methodology. Accordingly, the results were synthesised using a narrative approach (Siddaway et al., 2019) as per Baumeister and Leary (1997), which would be most suitable for integrating diverse research evidence with different methodologies and hypotheses, and for theoretical formulation (Baumeister, 2013). The research findings were synthesised into main themes for reporting and discussion.

The methodological heterogeneity of studies was assessed in terms of quantity and diversity. Since the variability across studies was too high to aggregate the results statistically, statistical heterogeneity was not assessed. In the case of conflicting findings, evidence from studies with higher generalisability based on Constraints on Generality assessment was considered to be of greater weight in representing folk conceptions of

[5]We thank the peer reviewer Katherine Corker for the helpful suggestion regarding clarifying the pre- registration update and our focus on psychological studies but not experimental philosophy studies.

Table 1

Databases and Full Search Queries

Database	Full search query
APA PsycInfo (via EBSCOhost)	"free will" AND (concept* OR belie* OR intuit* OR perce* OR interp* OR think* OR view* OR feel*) AND (lay* OR ordinary OR folk OR people) Search modes: Boolean/Phrase | Limiters: English
Scopus (via Elsevier)	TITLE-ABS-KEY ("free will") AND TITLE-ABS-KEY (concept* OR belie* OR intuit* OR perce* OR interp* OR think* OR view* OR feel*) AND TITLE-ABS-KEY (lay* OR ordinary OR folk OR people) AND LIMIT-TO (LANGUAGE, "English")
Web of Science (via Clarivate)	TOPIC: ("free will") AND TOPIC: (concept* OR belie* OR intuit* OR perce* OR interp* OR think* OR view* OR feel*) AND TOPIC: (lay* OR ordinary OR folk OR people) Refined by: LANGUAGES: (ENGLISH) AND DOCUMENT TYPES: (ARTICLE OR EARLY ACCESS OR PROCEEDINGS PAPER OR BOOK CHAPTER) Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.
OpenDissertations (via EBSCOhost)	AB "free will" AND AB (concept* OR belie* OR intuit* OR perce* OR interp* OR think* OR view* OR feel*) AND AB (lay* OR ordinary OR folk OR people) Search modes: Boolean/Phrase
ProQuest Dissertations & Theses Global (via ProQuest)	noft("free will") AND noft(concept* OR belie* OR intuit* OR perce* OR interp* OR think* OR view* OR feel*) AND noft(lay* OR ordinary OR folk OR people) Language: English
Open Science Framework (OSF)	title:"free will" AND title:(concept* OR belie* OR intuit* OR perce* OR interp* OR think* OR view* OR feel*) AND title:(lay* OR ordinary OR folk OR people)
PsyArXiv	"free will" AND (concept* OR belie* OR intuit* OR perce* OR interp* OR think* OR view* OR feel*) AND (lay* OR ordinary OR folk OR people)

free will. The overall generalisability, consistency, and strength of evidence were examined and discussed.

Results

A total of 18 articles published between 2008 and 2020 were included in the present systematic review (Figure 1). Fifteen articles were journal articles, two were book chapters, and one was an unpublished manuscript provided by an author via personal communication. The 18 articles comprised 41 individual studies, in which five studies were not eligible for this review for the following reasons: focused on the causes or consequences of free will beliefs ($k = 4$), and used for scale validation only ($k = 1$). The final number of studies included in the systematic review was $k = 36$.

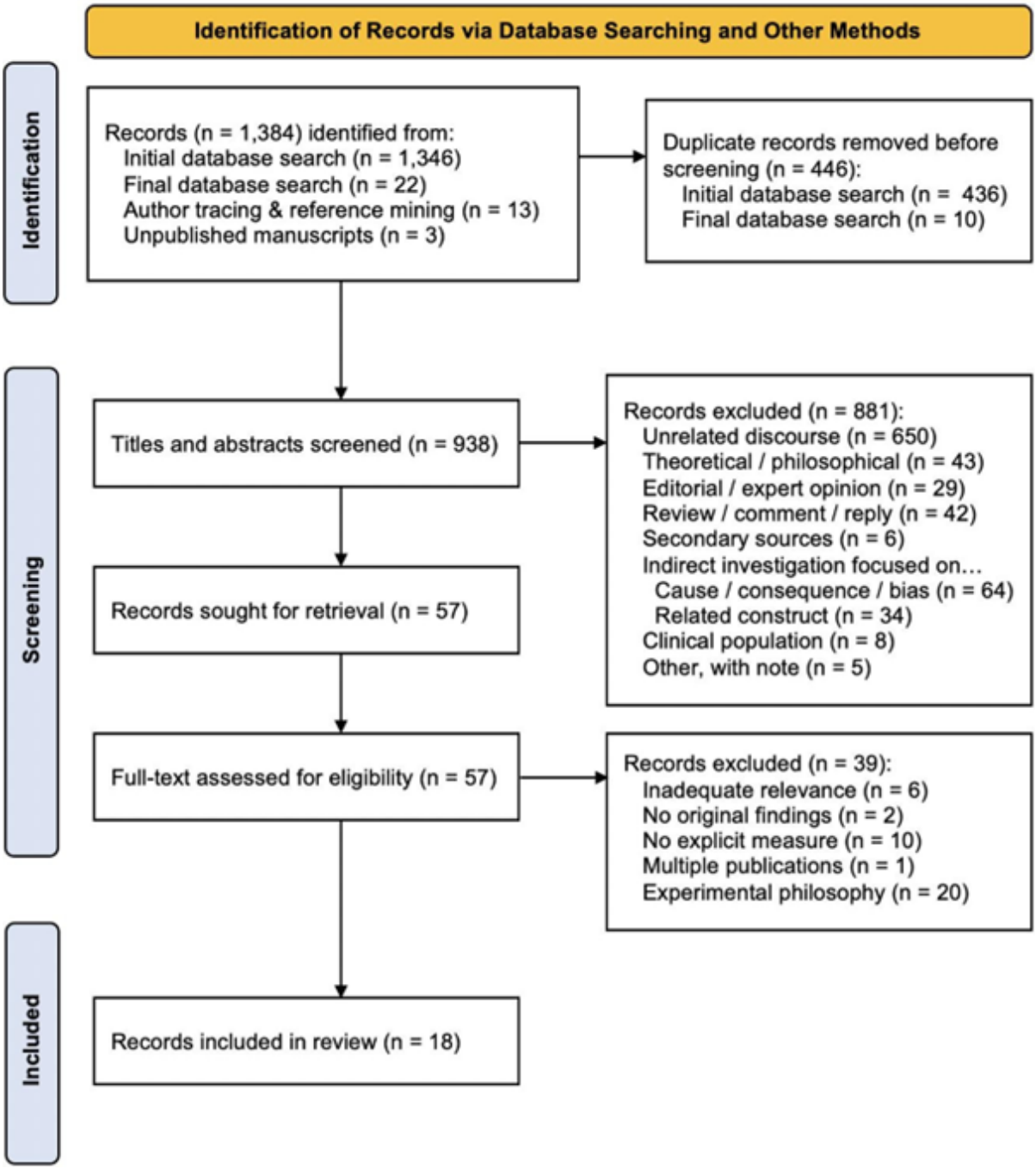
The search for pre-prints on OSF and PsyArXiv did not yield any eligible articles after scanning abstracts on the webpages. As citations could not be exported, records were saved as .pdf files and available on OSF, but were not reported in Figure 1.

Sample Characteristics

The characteristics of the studies included in this systematic review were summarised in Table 2.

Figure 1

PRISMA 2020 Flow Diagram (Page et al., 2021) of Screening Process and Results



Note. All duplicate records were manually checked and removed using EndNote X9. "n" refers to number of records.

Table 2

Characteristics of Included Studies (k = 36)

Authors, Year	Country	Study Design	Size[a]	Population	Mean age (SD)	Sex	Ethnicity	Education	Area of conception
Cracco et al., 2020	Belgium	Correlational; Survey	1,100	US (76%); Project Implicit	32.2 (12.7)	Male (56%)	Caucasian (77%)[b]	Degree(s) in tertiary education (90%)[b]	Free will attitudes
Feldman et al., 2014	Hong Kong SAR, US	S1, S2: Correlational; Survey; S3, S4: Experimental (between-group); Survey	S1: 98; S2: 63; S3: 114; S4: 186	S1: Hong Kong[b]; Undergraduates; S2: US; MTurk; S3: Mostly US & India[b]; MTurk; S4: Mostly India[b]; MTurk	S1: 19.1 (0.5); S2: 38.7 (12.9); S3: 32.7 (10.6); S4: 30.3 (8.4)	S1: Female (52%); S2: Female (63%); S3: Female (57%); S4: Male (59%)	N/A	S1: Univ. students; S2–S4: N/A	Free will beliefs
Forstmann & Burgmer, 2018	US, Germany	S1, S2: Correlational; Survey	S1: 364; S2: 297	US[b]; MTurk	S1: 36.4 (11.9); S2: 33.2 (10.6)	S1: Male (51%); S2: Female (53%)	N/A	S1, S2: Degree(s) in tertiary education (76%)[b]	Free will beliefs
Laurene et al., 2011[c]	US	Correlational; Survey	150	Juvenile detention centres (n = 68), jails (n = 82)	Adolescents: 15.6 (1.3); Adults: 28.3 (8.5)	Adol: Male (60%); Adults: Male (54%)	Mostly Caucasian	N/A	Free will beliefs
Monroe et al., 2014	US	S1a: Experimental (between-group); Vignette; S1b: Descriptive; Open-ended survey; S2: Experimental (between-group); Vignette	S1a: 197; S1b: 46; S2: 124	US[b]; MTurk	S1a: 35.5 (13.6); S1b: 35.6 (13.4); S2: 28.2 (9.5)	S1a: Female (60%); S1b: Male (57%); S2: Female (65%)	Caucasian (76–87%)	S1a: Degree(s) (73%); S1b: Degree(s) (74%); S2: Broad range	Free will attributions
Monroe & Malle, 2010	US	S1: Descriptive; Open-ended survey; S2: Descriptive; Interview	S1: 180; S2: 175	US; Undergraduates	N/A	N/A	N/A	Univ. students	Free will concepts
Monroe & Malle, 2014	US	S1: Descriptive; Interview; S2, S3: Quasi-experimental (within-subject); Vignette (RT measure)	S1: 39; S2: 53; S3: 46	S1: Community; S2, S3: N/A	S1: 34.2 (15.5); S2, S3: N/A	S1: Male (51%)	N/A	N/A	S1: Concepts; S2, S3: Attributions

Note. Characteristics of multiple studies within an article were reported separately as S1 = study 1, S2 = study 2, etc. N/A = not available.

[a] Sample sizes after exclusions were reported. [b] Supplementary data provided by the authors via personal communication (Appendix B).

[c] Sample characteristics provided (mean age, SD, sex) were based on full samples including exclusions.

[d] Unpublished manuscript provided by the authors via personal communication.

Table 2 (continued)

Authors, Year	Country	Study Design	Size[a]	Population	Mean age (SD)	Sex	Ethnicity	Education	Area of conception
Nahmias et al., 2020[c]	US	S1, S2: Experimental (between-group); Vignette	S1: 324; S2: 278	US; Undergraduates	S1: 19.8 (N/A); S2: 20.0 (N/A)	S1: Female (68%); S2: Female (70%)	N/A	Univ. students	Free will attributions
Nahmias et al., 2014[c]	US	S1–S3: Experimental (between-group); Vignette	S1: 223; S2: 185; S3: 180	US; Undergraduates	S1: 21.3 (4.9); S2: 22.8 (6.9); S3: 21.0 (7.6)	S1–S3: Female (58–66%)	N/A	Univ. students	Free will attributions
Rakos et al., 2008	US	Correlational; Survey	161	High school (n = 76), Undergraduates (n = 85)	HS: 14.5 (0.6)[b]; Univ: N/A	HS: Female (60%)	Mostly Caucasian	HS/Univ. students	Free will beliefs
Shepard & Reuter, 2012	US	Experimental; Vignette	44	US; Undergraduates	N/A	N/A	N/A	Univ. students	Free will attributions
Stillman et al., 2011	US	Experimental (between-group); Open-ended survey	99	Undergraduates	20.2 (N/A)	Female (56%)	N/A	Univ. students	Free will actions
Taylor et al., 2020[d]	US, Canada, NZ	S1, S2: Experimental (between-group); Vignette	S1: 382; S2: 430	US[b]; TurkPrime	S1: 39.0 (12.2); S2: 39.8 (12.9)[b]	S1: Male (53%); S2: Male (52%)	74–75% Caucasian	N/A	Free will attributions
Vonasch et al., 2018	US, Australia	S1–S3: Quasi-experimental (within-subject); Vignette; S4a,b: Experimental (between-group); Vignette	S1: 27; S2: 192; S3: 302; S4a: 386; S4b: 678	US; Undergraduates, MTurk	S2: 34.5 (11.9); S3: 35.4 (11.4); S4a: 36.4 (11.0); S4b: 36.5 (11.4)	S2: Female (59%); S3: Male (58%); S4a: Female (52%); S4b: Male (56%)	77–84% Caucasian[b]	S2: Degree(s) (64%)[b]	Free will attributions
Vonasch et al., 2017	US, Australia	S2: Experimental (between-group); S3: Experimental (between-group & within-subject); Vignette	S2: 201; S3: 121	S2: US[b]; MTurk; S3: Germany; Univ. panel	S2: 37.0 (11.6); S3: 26.0 (4.1)	S2: Female (51%); S3: Female (73%)	S2: 76% Cauc.; S3: Mostly Cauc.	S3: Univ. (85%), Degree (15%)[b]	Free will attributions
Willoughby et al., 2019	US	Correlational; Survey	301	US; MTurk	Age range: 18–55+	Male (57%)	N/A	Degree(s) (69%)	Free will beliefs
Wisniewski et al., 2019	Germany, Belgium	Correlational; Survey	1,800	US (n = 900), Singapore (n = 900); ResearchNow	US: 41.1 (12.9)[b]; SG: 38.9 (12.0)[b]	US: Female (51%); SG: Female (50%)	N/A	Degree(s) (59%)[b]	Free will beliefs

Note. Characteristics of multiple studies within an article were reported separately as S1 = study 1, S2 = study 2, etc. N/A = not available.

[a] Sample sizes after exclusions were reported. [b] Supplementary data provided by the authors via personal communication (Appendix B).

[c] Sample characteristics provided (mean age, SD, sex) were based on full samples including exclusions.

[d] Unpublished manuscript provided by the authors via personal communication.

Table 2 (continued)

Authors, Year	Country	Study Design	Size[a]	Population	Mean age (SD)	Sex	Ethnicity	Education	Area of conception
Yilmaz et al., 2018	Turkey	Correlational; Survey	630	Turkey; Streets of Istanbul	27.4 (9.8)	Female (54%)	Turkish	N/A	Free will beliefs

Sample Size. The 36 studies comprised a total of 10,176 participants. Sample size ranged from 27 to 1,800 participants, M = 283, SD = 336. Two-thirds of study samples (k = 24) had over 150 participants, in which k = 13 had 150–300 participants, k = 9 had 301–700 participants, and k = 2 included over 1,000 participants. One-third (k = 12) of samples had less than 150 participants, in which k = 3 used open-ended questions, k = 6 were vignette experiments, and k = 3 were surveys. Based on a suggestion by the reviewer Prasad Chandrashekar, we explored the association between the year of report and the sample size. The number of years ago of the report is negatively associated with the sample size, r = -0.50, 95 % CI [-0.72, -0.20], p = .003. This implies that the more recent studies tend to have larger sample sizes. The RMarkdown code and output (Xie et al., 2018) can be found here: https://osf.io/dfexy/

Population. Over half of the studies (56 %; k = 20) reported the country of participants in the original paper, and the authors of 13 studies provided the missing information upon request. Across the 33 studies, the most represented population was the United States (88 %; k = 29), followed by India (k = 2), Germany (k = 1), Hong Kong (k = 1), Singapore (k = 1), and Turkey (k = 1). One study included a small %age of participants from Canada, United Kingdom, Australia and New Zealand (all < 5 %. Half of studies (k = 18) collected data from an online platform, including Amazon Mechanical Turk (MTurk; k = 14), TurkPrime (now known as CloudResearch; k = 2), ResearchNow (now known as Dynata; k = 1), and Project Implicit (k = 1). One-third of studies (k = 12) collected data from university undergraduates, in which k = 1 also included high school students. Only a small number of studies (k = 3) used community participants.

Age. Almost two-thirds of studies (k = 23) reported information on the age of participants, in which 71 % (k = 17) reported mean age and SD, 17 % (k = 4) reported mean age without SD, and 25 % (k = 6) reported the age range. The mean age of participants ranged from 15.6 to 41.1. Upon request, some authors of studies (k = 9) supplemented information on participant's age: mean and SD (k = 7), SD only (k = 2).

Gender. Most studies (83 %; k = 30) reported the gender breakdown of samples, in which 63 % (k = 19) were mostly female participants (51–73 %), with the remaining 37 % (k = 11) mostly consisted of male participants (51–60 %). Only one sub-sample of a study had an equal number of male and female participants.

Ethnicity. Over half of studies (58 %; k = 21) did not report the ethnicity of participants, only eight studies reported ethnicity in the original paper, and authors of seven studies supplemented ethnic composition upon request. White was the most represented ethnicity (74–87 %; the majority in k = 14), followed by Asian (6–12 %), Black (5–9 %), and Hispanic (3–6 %). Note that two studies mainly collected data from countries such as India, even though ethnicity was not reported.

Education. Participants in almost one-third of studies (k = 11) were university undergraduates only, and two studies consisted mostly of undergraduates (53–85 %). Amongst the remaining studies (k = 23), only three studies provided information on the participants' level of education in the original paper, and authors of seven studies provided supplementary information upon request. The data showed that the majority of participants in these studies (k = 8) tend to be highly educated, with 59–90 % having attained degree(s) in tertiary education, with up to 24 % having attained a graduate degree or education.

Political Attitude. Only five studies reported political attitudes in the original paper, although the authors of four studies supplemented the information upon request. Across the nine studies, most samples (k = 6) were slightly liberal, two samples were considerably liberal, only one sample was slightly conservative.

Constraints on Generality: Representativeness of Samples

The overview of sample characteristics above indicated that most participants in the included studies were drawn from Western, Educated, Industrialised, Rich and Democratic (WEIRD; Henrich et al., 2010) populations, and were typically educated Whites (74–87 %) living in the United States (88 %).

Furthermore, about one-third of the study samples were university undergraduates, and half of the studies collected data via an online platform, which requires internet access and an adequate level of computer literacy. The samples were also more representative of female than male participants. Crucially, only five of 18 publications (Monroe and Malle, 2010; Taylor et al., 2021; Vonasch et al., 2017; Willoughby et al., 2019; Wisniewski et al., 2019) have considered the constraints on sample representativeness in their studies. Therefore, it should be noted that the samples in the current systematic review might not be representative of ordinary folk in the wider world, especially non-WEIRD and underprivileged populations, even if the participants were indeed theoretically and philosophically naïve about the concept of free will.

Table 3

Scales Used to Assess Free Will Beliefs and Sample Items

Scale and Characteristics	Sample Items (Item; Subscale)
Free Will and Determinism Scale (FWD; Rakos et al., 2008) – 22 items total – 4 items reverse-coded – 5-point Likert scale from "not true at all" to "almost always true"	"People have free will regardless of wealth or life circumstances." (21; General Will) "Free will is part of the human spirit." (26; General Will) "I have free will even when my choices are limited by external circumstances." (11; Personal Will) "I decide what action to take in a particular situation." (27; Personal Will)
Free Will and Determinism Plus Scale (FAD$^+$; Paulhus & Carey, 2011) – 27 items total – No reverse-coded item – 5-point Likert scale from "strongly disagree" to "strongly agree"	"People have complete free will." (21; Free Will) "Strength of mind can always overcome the body's desires." (26; Free Will) "I believe that the future has already been determined by fate." (1; Fatalistic Determinism) "As with other animals, human behavior always follows the laws of nature." (18; Scientific Determinism) "What happens to people is a matter of chance." (25; Unpredictability)
Free Will Inventory (FWI; Nadelhoffer et al., 2014) – 29 items total – No reverse-coded item in Part 1 – 7-point Likert scale from "strongly disagree" to "strongly agree" – Part 1 measures strength of belief; Part 2 measures relationships between beliefs	"People always have free will." (4; Free Will, Part 1) "Every event that has ever occurred, including human decisions and actions, was completely determined by prior events." (5; Determinism, Part 1) "The fact that we have souls that are distinct from our material bodies is what makes humans unique." (3; Dualism, Part 1) "Free will is the ability to make different choices even if everything leading up to one's choice (e.g., the past, the situation, and their desires, beliefs, etc.) were exactly the same." (1; Free Will, Part 2)

Constraints on Generality: Temporal and Cultural Specificities

Since the studies were drawn between the years of 2008 and 2020, and that the participants were mostly from the United States, findings about folk conceptions of free will may not be generalisable to cultures outside the United States and before the 2000s.

Nonetheless, four studies drew participants from non-Western samples (Hong Kong, Turkey, and India), and one study had a large sample (n = 900 from N = 1,800) from Singapore. This means that the cross-cultural study[6] consisted of both a Singapore sample with n = 900 and a United States sample with n = 900 (Wisniewski et al., 2019). The results of these studies were compared to the rest of the literature to better demonstrate the generalisability of findings.

Methodology and Methodological Heterogeneity

Study Design. The majority of studies adopted an experimental design (k = 17) with random assignment of participants to two or more conditions, mostly using vignettes (k = 14) and surveys (k = 3), including one with open-ended questions. Correlational designs were also common (k = 10); all were surveys. Five studies used a within-subject quasi- experimental design; all were vignettes experiments, in which two included a reaction time measure with practice trials. Four studies adopted a descriptive design, using open-ended interviews or surveys to explicitly inquire into the folk concept of free will, with responses independently coded by researchers for analysis.

Instruments. A total of nine distinct scales were used across the studies, including three scales for assessing free will beliefs: Free Will and Determinism Scale (Rakos et al., 2008), Free Will and Determinism Plus Scale (Paulhus and Carey, 2011), and Free Will Inventory (FWI; Nadelhoffer et al., 2014). For an illustrative

[6]We thank the reviewer Katherine Corker for the suggestion in clarifying regarding this cross-regional study by Wisniewski et al. (2019).

example of items from scales assessing free will beliefs, see Table 3. FWD was adopted by six studies (full scale: $k = 3$; Personal Will subscale only: $k = 3$), FAD+ was adopted by six studies (full scale: $k = 4$; Free Will subscale only: $k = 1$; mix of Free Will and Fatalistic Determinism subscales: $k = 1$; modification: $k = 1$), and FWI was adopted by three studies (full scale: $k = 1$; mix of Free Will and Determinism subscales: $k = 2$).

Scales used for the correlation of various constructs with free will conceptions include Implicit Association Test (IAT; Greenwald et al., 1998); (Greenwald et al., 2009), Belief in Genetic Determinism Scale (BGD; Keller, 2005), Belief in Social Determinism Scale (BSD; Rangel and Keller, 2011), Lay Estimates of Genetic Influence on Traits (LEGIT; Willoughby et al., 2019), Mind-Body Relations Scale adapted from Hook and Farah (2013), and Rational- Experiential Inventory (REI; Epstein, 1994).

There were 19 different vignettes used across the studies, six of which were adapted from existing vignette experiments. There were a total of four adapted tasks, including three recall tasks and one task for choice cognitive association.

Five studies adopted open-ended survey or interview, which were the most direct investigations of folk concepts of free will. For example, participants were asked to "explain in a few lines what you think it means to have free will" (Monroe and Malle, 2010, p.214), "describe an experience in your life when you took action that you consider to have been of your own free will" (Stillman et al., 2011, p.387), and "If you wanted to build a biological organism [or a robot] that had free will, what abilities would it need to have?" (Monroe and Malle, 2014, p.31).

Areas of Conception. Most studies investigated free will attributions ($k = 20$), followed by free will beliefs ($k = 11$), free will concepts ($k = 3$), free will actions ($k = 1$), and free will attitudes ($k = 1$). All studies investigating free will attributions used vignettes (experimental or quasi-experimental), and all studies investigating free will beliefs used surveys. Studies investigating free will concepts and free will related actions ($k = 4$) used open-ended questions to probe folk conceptions of free will.

Replicability and Reproducibility. Only seven studies were pre-registered on platforms such as AsPredicted (https://aspredicted.org/), in which one study was a registered report with open data and code. Two authors provided original data on their studies ($k = 8$) in personal communication.

Methodological Heterogeneity. The methodology and materials used in the studies under review were diverse, yet sufficiently similar within areas of conception for comparison. However, the vast majority of studies relied on self-report and may be affected by responses biases such as social desirability and acquiescence.

Constraints on Generality: Materials and Procedures

The scales used to assess free will beliefs, FWD, FAD+ and FWI, were widely adopted and validated scales with satisfactory reliability. Notably, FAD+ has been adapted into Polish (Charzyńska and Wysocka, 2014), French (Caspar et al., 2017), and Turkish (Yilmaz et al., 2018), and appeared to be generalisable across cultures. Yet, as many authors recognised, the results of vignette experiments could be affected by variations in phrasing, and participants' ability to interpret and internalise the scenarios.

Results of included studies

Most studies reported statistically significant results relevant to this review, except studies that used open-ended questions (k = 5), and two studies which found no significant difference in free will endorsement between participant groups.

Effect Sizes. A total of 29 effect sizes were extracted from 9 articles (k = 12), in which 13 were small–medium effects, 8 were medium–large effects, 6 were large–very large effects, and 2 were very large effects. Effect size interpretations were based on Cohen's benchmarks (Cohen, 1988, 1992) for Cohen's *d*, Pearson's *r*, and *r* square. A summary of results and effect sizes labels (based on Cohen's benchmarks) was presented in Table 4.

Significance/Non-Significance of Findings[7]. Out of 31 studies that reported p-values for effects of interests, most studies (18 studies) reported mostly or all significant results. For studies that did not pre-register (24 studies), over 60 % of studies (15 studies) reported mostly or all significant results, and over a third of studies (9 studies) reported mixed results with some significant and non-significant findings. For studies that pre-registered (7 studies), over half of the studies (4 studies) reported mixed findings, whereas 3 studies reported mostly or all significant findings. See Table 5 for details.

*Publication Bias.*Since assessment of publication bias using methods such as funnel plot is unreliable when there are fewer than 10 publications reporting effect sizes, especially when heterogeneity is high (Sterne et al., 2011), publication bias cannot be evaluated. To

[7]We appreciate the reviewer Prasad Chandrashekar for the helpful suggestion of adding a section regarding significance or non-significance of findings for pre-registered and non-registered studies.

avoid a biased estimate of results, this systematic review had sought to locate unpublished studies from 15 first authors in the field and retrieved three unpublished manuscripts, in which one manuscript ($k = 2$) was eligible for review. The other 17 published work were found in diverse sources, including 12 different journals and two books, which can be assumed to have varying publication standards.

Table 4

Summary of Main Results and Effect Sizes

Authors, Year	Main Results	Effect Size(s)[a]
Cracco et al., 2020	– Explicit and implicit attitudes towards free will were more positive than attitudes towards determinism. – People perceived cultural pressure to value free will, but it had no significant effect on free will attitudes.	– very large (implicit); large–very large (explicit) – small–medium, medium–large
Feldman et al., 2014	Belief in free will was linked to the concept of choice, in terms of: – Preference for choice – Perceived ability to choose – Association of choice with freedom – Perception of actions as choices – Choice recall activates belief in free will	– small–medium – medium–large – small–medium – medium–large, 2 large – N/A
Forstmann & Burgmer, 2018	– Belief in free will was consistently predicted by substance dualism but not reductive physicalism. – Belief in free will was predicted by faith in intuition but not need for cognition.	– small; small–medium – N/A
Laurene et al., 2011	– Free will was strongly endorsed by incarcerated adolescents and adults alike (76% and 79% of maximum score, respectively), even when personal freedom is constrained.	– N/A
Monroe et al., 2014	– Free will attribution was predominately predicted by three psychological capacities: choice, intentional agency, and sole cause of action (understood by 45% of participants as absence of constraints). – Free will attribution was also uniquely predicted by the presence of a soul, but to a lesser extent. – Although the majority (68%) reported a belief in souls, the belief had no significant effect on free will attribution.	– medium–large, 2 large (all capacities); medium–large (choice & intentionality) – small, small–medium – n.s.
Monroe & Malle, 2010	– People defined free will as a choice (65%) that fulfils one's desires (33%) and is free from internal or external constraints (29%). – Free will did not invoke metaphysical assumptions about dualism, indeterminism, or uncaused cause in laypeople. – Most people (74%) were not convinced by the neuroscientists' claim that free will is an illusion, and counterargued by reaffirming a person's ability to choose (59% of rejoinders).	– N/A

Note. N/A = not available; n.s. = not significant. See footnotes below.

Table 4 (continued)

Authors, Year	Main Results	Effect Size(s)[a]
Monroe & Malle, 2014	– People defined free will as a choice (41%) that fulfils one's desires (38%), free from internal or external constraints (74%) and involves forethought (26%). – People considered choice (81%), capacity for autonomy to resist constraints (35%), having a soul (28%), consciousness (22%), being ambulatory (22%), having desires, goals, and preferences (16%), and having moral principles (14%) to be the necessary conditions for free will. – Most people considered free will to be a capacity that develops over the life span (71%), and can be lost (94%) due to coercion (63%), brain damage (40%), and physical limitations (37%) like paralysis. – People's speed to infer free will clustered with intentionality, choice and options, but metaphysical considerations about breaking the causal flow and being uncaused were significantly slower.	– N/A
Nahmias et al., 2020	– Although free will attributions were predicted by perceived capacity for conscious experiences, there was no significant direct effect when taking the agent's capacity to experience basic emotions and Strawsonian emotions into account.	– N/A
Nahmias et al., 2014	– Free will attributions were reduced by manipulation of behaviours by scientists and mind readers, but not by mere prediction of behaviours. – Majority (80–82%) of participants believed scientific technology capable of predicting and manipulating behaviours could exist, but this belief did not have a significant effect on free will attributions.	– N/A
Rakos et al., 2008	– Free will was strongly endorsed by adolescents and adults alike (79% of the maximum score in both samples).	– N/A
Shepard & Reuter, 2012	– Free will attribution was higher in cases where a choice was predicted (86%), but less so when a choice was manipulated (23%) by neuroscientific technology. – Free will attribution was strongly predicted by choice attribution. – The unconditional ability to choose otherwise had no significant effect on free will attribution.	– N/A – very large – n.s.
Stillman et al., 2011	– Acts of free will were associated with conscious deliberation, acting against external influence and in accord with moral beliefs, goal attainment, positive outcomes, and avoiding harm to social group. – Actions not considered a result of free will were associated with lower level of conscious thought, harm to social group and presence of powerful figures.	– N/A
Taylor et al., 2020[b]	– Both direct and indirect free will attributions were predicted by the presence of a choice in the past. – Direct and indirect free will are positively correlated but distinct constructs.	– N/A – medium–large
Vonasch et al., 2018	– Free will attribution was reduced by internal constraints, including lower intellect, lower perceived conscious decision-making capacities (restrained by scientific manipulation or lacking a soul), having an addiction without a desire to quit. – Free will attribution was reduced by external constraints, including being a subordinate and following orders, being forced at gunpoint, having been drugged, receiving subliminal message. – Having a soul had an indirect effect on free will attribution via conscious decision-making (83% of the effect of having a soul), but no significant direct effect.	– N/A
Vonasch et al., 2017	– People thought addiction to both genuinely and figuratively addictive substances reduces free will. – Free will attributions reduced by addiction remained lower than pre-addiction throughout the stages of addiction onset, quitting and relapse, suggesting people thought the reduction of free will due to addiction is immutable.	– N/A – small–medium (onset); medium–large (quitting); small–medium (relapse)

Note. N/A = not available; n.s. = not significant. See footnotes below.

Table 4 (continued)

Authors, Year	Main Results	Effect Size(s)[a]
Willoughby et al., 2019	– Belief in free will was linked to beliefs about high genetic contribution to purely physical traits, but not psychological, psychiatric, or lifestyle traits. – The correlation between endorsement of free will and endorsement of determinism was negative and weak, offering no support for a "compatibilist" or "incompatibilist" position on free will.	– small–medium, medium – 2 small
Wisniewski et al., 2019	– The majority of people across cultures believed in free will (82% US; 85% Singapore) and dualism (76% US; 88% Singapore), but had differing views on determinism (31% US; 59% Singapore). – Dualism was more predictive of free will beliefs than libertarian and compatibilist intuitions; the majority (77% US; 83% Singapore) thought an immaterial soul is necessary for free will. – Lay beliefs about free will were often logically inconsistent; the majority (86% US; 92% Singapore) believe in both compatibilist and incompatibilist definition of free will.	– N/A – small–medium (US); large (Singapore) – N/A
Yilmaz et al., 2018	– A predominately Muslim (72%) sample believed in free will more than scientific determinism and fatalistic determinism. – Turkish participants considered free will to be compatible with scientific determinism and fatalistic determinism.	– N/A

Notes. N/A = not available; n.s. = not significant.
[a] For exact values of effect sizes, please refer to the online data extraction table "Statistics (original text)" column on OSF (https://osf.io/9gud2).
[b] Unpublished manuscript provided by the authors via personal communication (per the review).

Narrative Synthesis

The results were synthesised into four main themes for analysis: (1) definitions of free will; (2) conditions for free will; (3) functions of free will; and (4) endorsement and attitudes towards free will (see Table 6).

Theme 1: Definitions, Meanings, and Attributions[8] *of Free Will*

When explicitly asked what it means to have free will, people across studies defined free will as a choice that fulfils one's desires and is free from internal or external constraints (Monroe and Malle, 2010; Monroe and Malle, 2014), which may also involve forethoughts (Monroe and Malle, 2014). Acts of free will were similarly defined by conscious deliberation and acting against external influence (Stillman et al., 2011).

People considered free will to be dynamic, as a capacity that develops over the lifespan and may be lost (Monroe and Malle, 2014), such as in the case of addiction, free will attribution to a person who experienced addiction remained lower than pre-addiction even after quitting (Vonasch et al., 2017). Free will could be considered as direct or indirect, that is, to have freedom of choice at the moment, or in the past (Taylor et al., 2021). Direct free will involves decisions at the present whereas indirect free will involves prior free choices that cause the outcome (McKenna, 2012; Taylor et al., 2021)[9].

Theme 2: Conditions for Free Will

Choice. When explicitly asked what are the conditions for free will, most people considered having a choice (81 %) to be necessary for free will (Monroe and Malle, 2014). The ability to make a choice was a recurrent theme across vignette experiments, where free will attributions were predicted by whether participants thought the agents made a choice (Monroe and Malle, 2014; Monroe et al., 2014; Shepard and Reuter, 2012), even if it was a choice made in the past (Taylor et al., 2021). Perceived ability to choose, perception of actions as choices, as well as recalling past choices instead of actions predicted belief in free will (Feldman et al., 2014).

Conscious Deliberation. People thought free will require consciousness and intentional agency (Monroe and Malle, 2014; Monroe et al., 2014), and acts of free will require conscious thoughts (Stillman et al., 2011); although counterintuitively, belief in free will was not predicted by need for cognition, but faith in intuition (Forstmann and Burgmer, 2018). Nonetheless, the effects of consciousness attribution on free will attribution became non- significant after taking the capacity to experience emotions into account (Nahmias et al., 2020).

Internal and External Constraints. People considered the capacity for autonomy to resist constraints important for free will (Monroe and Malle, 2014; Monroe et al., 2014). In terms of internal constraints, people considered lower intellect and lower conscious decision-making capacities (Vonasch et al., 2018), and having an addiction (Vonasch et al., 2017; Vonasch et al., 2018) to diminish free will. In terms of external constraints, people considered manipulation of behaviours by scientists or mind readers to reduce free will, but the mere prediction of future behaviours does not (Nahmias et al., 2014; Shepard and Reuter, 2012). Similarly, being coerced to do something by force (Monroe and Malle, 2014; Vonasch et al., 2018) or by subliminal influence, as well as being a subordinate who must follow orders reduced free will attribution (Vonasch et al., 2018). Physical limitations like brain damage and paralysis were also considered to be potential causes for losing free will (Monroe and Malle, 2014).

Dualism. Some evidence from United States and Singaporean participants suggested that people think having a soul is necessary for free will (Monroe et al., 2014; Monroe and Malle, 2014; Wisniewski et al., 2019), despite to a lesser extent than the importance of capacities for choice and intentional agency (Monroe et al., 2014). Substance dualism also predicted belief in free will across cultures (Forstmann and Burgmer, 2018; Wisniewski et al., 2019). However, the effect of having an immaterial soul on free will may be indirect; when the capacity for conscious decision-making was taken into account, no significant direct effect was found (Vonasch et al., 2018).

Indeterminism. Metaphysical assumptions of indeterminism, such as breaking the causal flow and being the uncaused cause (Monroe et al., 2014; Monroe and Malle, 2014), or having the unconditional ability to choose otherwise (Shepard and Reuter, 2012) were not considered by people to be necessary conditions for free will.

[8] We thank the reviewer Prasad Chandrashekar for reminding us that there are studies (e.g. Vonasch et al., 2017) discussed in this section that focus on free will attributions, so we edited the subtitle to be clearer.

[9] We thank Prasad Chandrashekar for suggesting us to clarify regarding the meaning of direct free will and indirect free will.

Table 5

Presence or Absence of Pre-Registration and Significance or Non-Significance of Findings

Study	Presence or Absence of Pre-Registration	Findings
Cracco et al. (2020)	Present	Significant Results
Feldman et al. (2014) Study 1	Absent	Significant Results
Feldman et al. (2014) Study 2	Absent	Significant Results
Feldman et al. (2014) Study 3	Absent	Significant Results
Feldman et al. (2014) Study 4	Absent	Significant Results
Forstmann and Burgmer (2018) Study 1	Absent	Significant Results
Forstmann and Burgmer (2018) Study 2	Absent	Mixed with Significant and Non-Significant Results
Laurene et al. (2011)	Absent	Mixed with Significant and Non-Significant Results
Monroe et al. (2014) Study 1a	Absent	Significant Results
Monroe et al. (2014) Study 1b	Absent	Descriptive Statistics Only
Monroe et al. (2014) Study 2	Absent	Mixed with Significant and Non-Significant Results
Monroe and Malle (2010) Study 1	Absent	Descriptive Statistics Only
Monroe and Malle (2010) Study 2	Absent	Descriptive Statistics Only
Monroe and Malle (2014) Study 1	Absent	Descriptive Statistics Only
Monroe and Malle (2014) Study 2	Absent	Significant Results
Monroe and Malle (2014) Study 3	Absent	Significant Results
Nahmias et al. (2020) Study 1	Absent	Significant Results
Nahmias et al. (2020) Study 2	Absent	Mixed with Significant and Non-Significant Results
Nahmias et al. (2014) Study 1	Absent	Mixed with Significant and Non-Significant Results
Nahmias et al. (2014) Study 2	Absent	Mixed with Significant and Non-Significant Results
Nahmias et al. (2014) Study 3	Absent	Significant Results
Rakos et al. (2008)	Absent	Descriptive Statistics Only
Shepard and Reuter (2012)	Absent	Mixed with Significant and Non-Significant Results
Stillman et al. (2011)	Absent	Significant Results
Taylor et al. (2021) Study 1	Present	Mixed with Significant and Non-Significant Results
Taylor et al. (2021) Study 2	Present	Mixed with Significant and Non-Significant Results
Vonasch et al. (2018) Study 1	Absent	Mixed with Significant and Non-Significant Results
Vonasch et al. (2018) Study 2	Absent	Significant Results
Vonasch et al. (2018) Study 3	Present	Significant Results
Vonasch et al. (2018) Study 4a	Present	Mixed with Significant and Non-Significant Results
Vonasch et al. (2018) Study 4b	Present	Mixed with Significant and Non-Significant Results
Vonasch et al. (2017) Study 2	Present	Significant Results
Vonasch et al. (2017) Study 3	Absent	Significant Results
Willoughby et al. (2019)	Absent	Significant Results
Wisniewski et al. (2019)	Absent	Significant Results

Note. "Significant Results" imply 80% or more p-values in the study are significant.

Table 5 (continued)

Study	Presence or Absence of Pre-Registration	Findings
Yilmaz et al. (2018)	Absent	Mixed with Significant and Non-Significant Results

Added based on the suggestion by Prasad Chandrashekar, a peer reviewer.

Theme 3: Personal Experiences[10] *and Functions of Free Will*

Some participants reported personal events that illustrate multiple functions of free will (Stillman et al., 2011). When explicitly asked to provide an autobiographical account of actions that were the results of free will, people recalled actions that were carried out against external influence, in accord with moral beliefs, avoided harm to the social group, achieved desired goals, and had positive outcomes (Stillman et al., 2011). These results suggested that laypeople think free will function as a source of autonomy for personal goal attainment despite constraints, and is related to moral responsibility.

Theme 4: Endorsement and Attitudes Towards Free Will

Free Will Endorsement and Attitudes. Free will was strongly endorsed by people of different age groups and across cultures (Rakos et al., 2008; Wisniewski et al., 2019; Yilmaz et al., 2018), even when personal freedom was constrained by exceptional circumstances such as imprisonment (Laurene et al., 2011). People had more positive explicit and implicit attitudes towards free will than towards determinism, which were unaffected by perceived cultural pressure to value free will and devalue determinism (Cracco et al., 2020). People who believe in free will tended to only consider purely physical traits to be predetermined by genetic factors, whereas psychological, psychiatric and lifestyle traits were not considered to be predetermined by genes (Willoughby et al., 2019).

Endorsement for Dualism and Determinism. The majority (68–76 % in the US; 88 % in Singapore) of participants across cultures endorsed dualism and believed in souls (Monroe et al., 2014; Wisniewski et al., 2019). Nonetheless, belief in dualism had no significant effect on free will attribution (Monroe et al., 2014). In contrast, endorsement for determinism varied across cultures; people from the United States were less likely to endorse determinism (31 %), whereas the majority of people from Singapore believed in determinism (59 %; Wisniewski et al., 2019). Akin to attitudes towards free will and determinism, endorsement for free will was also significantly higher than endorsement for scientific determinism or fatalistic determinism, amongst a sample of Turkish participants (Yilmaz et al., 2018).

Compatibilism and Incompatibilism. Regarding whether people think free will is compatible with determinism, the results were mixed. Whilst a Turkish sample considered free will to be compatible with scientific determinism and fatalistic determinism (Yilmaz et al., 2018), belief in free will only weakly and negatively correlated with belief in determinism in a United States sample (Willoughby et al., 2019). Indeed, lay definitions of free will might be logically inconsistent; the vast majority of participants from both the United States and Singapore agreed with both the compatibilist and the incompatibilist positions on free will (Wisniewski et al., 2019).

Neuroscientific Challenges to Free Will. When confronted by neuroscientific challenges to free will, regardless of whether neuroscientific prediction of decisions was considered to be probable (Nahmias et al., 2014) or not (Monroe and Malle, 2010), free will attributions were unaffected (Nahmias et al., 2014). The reaffirmation of an individual's capacity to make choices was the most common counterargument (59 %) for free will (Monroe and Malle, 2010).

Discussion

The current review aimed to comprehensively search and narratively synthesise psychological studies on lay definitions, beliefs, intuitions, and attitudes about free will, to provide an overview of folk conceptions of free will grounded in empirical research, as the first systematic review on the subject. The results were drawn from 18 articles, which comprised 36 individual studies and a total of 10,176 participants, from a variety of regions including the United States, Germany, Turkey, Singapore, Hong Kong, and India. In line with previous research not included in the present review (e.g. Nadelhoffer et al., 2014; Paulhus and Carey, 2011; Sarkissian et al., 2010), our results showed that most people across the cultures surveyed strongly believed in free will, particularly with the support of Yilmaz et al. (2018), which used a translated version of FAD+ on Turkish community participants.

In the following discussion, findings on how ordinary folks conceptualise free will were explored under the psychological and metaphysical models of free will proposed by Monroe and Malle (2010).

Psychological Features: Choice, Freedom from Constraints, Goal Attainment

The current body of literature revealed considerable convergence in how ordinary folks conceptualise free will across cultures and age groups. Notably, the ability to choose, which may require conscious deliberation, intentional agency, and capacity to experience emotions, was a common theme in lay definitions, as well as perceived conditions and functions of free will. Additionally, freedom from internal and external constraints, such as coercion, manipulation, low intellect, and addiction, was often considered a necessary condition for free will. Indeed, the ability to choose freely without constraints, or in other words, to be able to act otherwise in a given situation, was often adopted as an academic definition of free will in psychology (e.g. Baumeister, 2008; Feldman, 2017; Racine, 2017).

People also think free will serves the function of personal goal attainment such as fulfilling desires, acting in accord with moral beliefs, and avoiding harm to the social group (Stillman et al., 2011). The idea that free will is only worth wanting if it empowers individuals to get what they want has been proposed by Dennett (Dennett, 2003). This folk conception of free will also supports the cultural-animal argument, that free will is an adaptive human trait that provides the capacity for rational decision-making and self-control essential to living harmoniously in a cultural society (Baumeister, 2008).

[10] We thank the reviewer Prasad Chandrashekar for the helpful comment regarding the subtitle, that motivated us to change the title to include the phrase "personal experiences".

Table 6

Free Will Conceptions Organised by Main Themes

Main Themes	Conceptions
Definitions of free will	– Choice
	– Fulfilment of desires
	– Absence of constraints
	– Conscious deliberation
	– Free will as a dynamic construct
	– Free will as direct (present) and indirect (past)
Conditions for free will	– Having a choice and options
	– Having intentional agency
	– Having personal autonomy to resist constraints
	– Having consciousness
	– Having emotions
	– Having a soul (dualism)
	– Having an ambulatory body
	– Absence of internal and external constraints
	– Absence of manipulation on behaviours
	– Absence of prediction of behaviours
	– Indeterminism (nondeterministic causation)
Functions of free will	– Ability to make conscious choices
	– Goal attainment
	– Moral behaviour
	– Avoidance of harm to social group
Endorsement and attitudes towards free will	– Belief in free will
	– Explicit and implicit attitudes towards free will
	– Perceived cultural pressure to value free will
	– Belief in determinism (scientific/fatalistic)
	– Belief in souls (dualism)
	– Possibility of neuroscientific prediction of choices

In other words, free will can be considered as a social tool (Feldman, 2017).

It should be noted that this finding emanated from descriptive studies (Monroe and Malle, 2010; Monroe and Malle, 2014; Stillman et al., 2011), which relied on participants' explicit reports, and therefore the results may be affected by response and recall biases. More evidence from studies employing different methods is needed to support the finding. It should also be mentioned that the notion of moral behaviour only emerged as a minor function of free will when participants were asked to recall actions that were the results of free will (Stillman et al., 2011) or describe the conditions of free will (Monroe and Malle, 2014), but not when they were asked to define what it means to have free will (Monroe and Malle, 2010; Monroe and Malle, 2014). Hence, even though scholars (e.g. Dennett, 2008; Kant, 2015) have traditionally assumed free will to be closely connected with moral responsibility, the reviewed evidence only provided limited support for the morally motivated account of free will (Clark, 2014; Clark et al., 2019). It could be argued that the connection between free will and moral responsibility is an implicit cognition and therefore not easily evoked. Regardless, the reasons why people believe in free will is outside the scope of the present review.

Free will is considered to be a dynamic construct that develops and fluctuates across the lifespan, as attested by variations in free will attribution to agents of differing physical and mental capacities in vignette experiments (see Monroe and Malle, 2014; Vonasch et al., 2017). Free will attributions and beliefs may change depending on environments and in-

dividual states (see Seto, 2024)[11]. This was in line with a review of recent research on free will beliefs (Ewusi-Boisvert and Racine, 2018), which also found multiple studies suggesting that factors such as cognition, volition, and even bodily states could influence the belief in free will. Importantly, free will attributions were dependent on the absence of situational constraints such as coercion and manipulation. However, the studies reviewed did not elucidate whether the folk's free will attributions reflected the belief that agents under constraints have reduced or no free will, or that they were unable to exercise free will in those circumstances. Future research could explore this distinction by adopting different phrasing in vignette experiments, to delineate whether extreme constraints eliminate free will entirely, or merely take away the agent's ability to exercise free will.

To conclude, the literature revealed that that ordinary folk conceptualise free will under a psychological model, as proposed by Monroe and Malle (2014), which is akin to the concept of modest free will offered by Mele (2014). As asserted by Feldman et al. (2014), "the everyday social reality of beliefs about free will is a matter of how people think and feel about choice" (abstract). Crucially, this pattern consistently emerged in studies adopting diverse methodologies, from explicitly asking people to explain what it means to have free will to measuring people's attribution of free will to agents in imaginary scenarios. It appeared that for ordinary folk, free will is a psychological capacity for decision-making that varies with circumstances and from individual to individual. Having the ability to make decisions following one's goals and desires, without being subjected to undue force and being reasonably free from internal and external constraints, are sufficient for the folk's concept of free will.

Metaphysical Considerations: Consciousness, Dualism, Determinism

Regarding the perceived requirement of consciousness for free will, the results were inconclusive. Although free will attributions were generally correlated with consciousness attributions, the effect of consciousness on free will may be indirect and largely mediated by the capacity to experience emotions (Nahmias et al., 2020). It has been suggested that personal will, similar to brain states, could be both conscious and unconscious, depending on the circumstance (Deecke, 2012). According to Cognitive-Experiential Self-Theory (CEST), a dual-process model by Epstein (1994), the rational system and the emotionally driven experiential system are interactive. This interaction could explain the mediation identified in Nahmias et al. (2020), as well as the counterintuitive finding that free will belief was predicted by experiential, but not rational thinking style (Forstmann and Burgmer, 2018). Whilst consciousness was often assumed to be entwined with free will by scientists and philosophers (e.g. Baumeister et al., 2010; Blackmore, 1999; Rakos, 2004; Sartre, 1972; Strawson, 1989), more evidence is needed to explicate the relevance of consciousness to free will in laypeople's understanding of the concept.

On dualism, multiple studies involving both university students and community participants from the United States and Singapore suggested that the condition of having a soul was predictive of free will attributions. However, similar to the findings on the requirement of consciousness, the effect of having an immaterial soul on free will was indirect and became non-significant after mediating for the capacity for conscious decision- making (Vonasch et al., 2018). Vonasch et al. (2018) suggested that people considered souls to be crucial for free will only because they perceived having a soul can facilitate conscious decision-making and acting against internal and external constraints. Monroe et al. (2014) also proposed that if people conceptualise free will under the metaphysical model and consider having a soul to be necessary for free will, the soul may be understood as an uncaused cause or "first mover" that capacitate the agent to be free from deterministic constraints and intervene on the causal flow of the universe. Future research can further test the potential pathways mediating the effects of consciousness and dualism on free will attributions.

The current review found no reliable evidence that the folk consider free will to require metaphysical assumptions of indeterminism, such as having the ability to break the causal flow of the universe, being the uncaused cause, or having the unconditional ability to choose otherwise. Free will was often presumed to be linked to determinism in both psychological and philosophical literature, to the extent that all three scales used to assess free will beliefs (FWD, FAD+ and FWI) have a dimension measuring beliefs in determinism. However, determinism may not be strongly associated with folk notions of free will, as evinced by the results of studies with United States participants showing that even full prediction of decisions and behaviours does not reduce free will attribution (Nahmias et al., 2014; Shepard and Reuter, 2012). Nonetheless, these results may be explained by the finding that most people in the United States do not endorse determinism (Wisniewski et al., 2019), which echoed the conclusion of a cross-cultural study from the experimental philosophy paradigm that the majority of people from the United States, Columbia, India, and Hong Kong considered the universe to be indeterministic (Sarkissian et al., 2010). Similarly, Monroe and Malle (Monroe and Malle, 2010) found undergraduates from the United States to be unconvinced by the claim that all behaviours are caused by neural impulses, which suggests a deterministic universe; instead, the participants contended that people have the capacity to make a choice, and neural impulses cannot explain all human behaviours. A cross-cultural and cross-linguistic study from experimental philosophy (Hannikainen et al., 2019) showed that there may be important cultural differences in how people perceive indeterminism to be a necessary condition for free will; whereas being the ultimate source of one's actions promoted free will beliefs in United States, European, and Middle Eastern participants, the same pattern was not found in South and East Asian participants.

The present review also found no conclusive evidence on

[11] We thank Prasad Chandrashekar, the reviewer, for the comment that encourages us to explain how free will can be dynamic.

whether people consider free will to be compatible with determinism. The lack of strong and consistent correlations between belief in free will and belief in determinism could be an indicator that the folk are neither inherently compatibilists or incompatibilists, as suggested by Willoughby et al. (2019). The compatibility question has remained unanswered in contemporary free will debate, as the results of research on folk intuitions of free will, which mostly came from experimental philosophy, were highly conflicted (Clark et al., 2019; Murray and Nahmias, 2014). Although it is reasonable to expect laypeople to have less consensus on such a complex philosophical issue (Baumeister and Brewer, 2012), which even scholars stumble upon, it has been argued that the assumption that ordinary folk are either natural compatibilists or incompatibilists is fundamentally misguided (Deery et al., 2015). Baumeister and Monroe (2014) asserted that psychologists attempting to establish the compatibility of free will with determinism are "essentially doing amateur philosophy" (p.3), and research efforts would be better devoted to the contents and behavioural consequences of free will beliefs.

As a whole, the reviewed evidence was insufficient to support a metaphysical model of free will, which would involve some special form of mental causation of behaviours outside the natural laws of causality, and may not be possible to explain scientifically (Guglielmo et al., 2009). The metaphysical definition of free will was often adopted by scholars (e.g. Wegner, 2002) and is akin to ambitious free will (Mele, 2014), which requires an unconditional ability to choose otherwise, independent of genetic and environmental influences, as well as one's own neural activities. It should be acknowledged that most philosophers involved in contemporary free will debates no longer adopt this magical definition of free will (Mele, 2014).

To conclude, the results suggested that lay conceptions of free will are more aligned with the psychological model than the metaphysical model, and with modest free will instead of ambitious free will. The effect of having a soul on free will attribution may be fully mediated by the capacity for conscious decision-making, whereas the effect of consciousness was mediated by the capacity to experience emotions. We recommend researchers to adopt the psychological model of free will without metaphysical assumptions as a working definition for future investigations, and further explore the potential mediation pathways in free will attributions.

Strengths, Limitations in the Literature and Future Research Directions[12]

Although systematic reviews provide the highest level of evidence that cannot be achieved by a single study, the conclusion drawn is only as strong as the evidence available for review (Siddaway et al., 2019).

First and foremost, the studies included in our review heavily relied on data drawn from participants in WEIRD populations. Almost one-third of studies involved university undergraduates only, who would be more exposed to influences of Western cultures (Sarkissian et al., 2010). Community participants from online platforms were also mostly Whites from the United States and other industrialised countries. As acknowledged by Willoughby et al. (2019), these samples are typically more educated and more liberal than the normal population. Overreliance on WEIRD population is a well-known problem in both psychology and experimental philosophy literature on free will beliefs (Ewusi-Boisvert and Racine, 2018; Hannikainen et al., 2019). A recent review of research on the belief in free will examining its construct and external validity by Berniūnas et al. (2021) found up to 91 % of participants in these studies to be WEIRD, and the authors contended that the concept and lexical expressions of the term "free will" have no cross-cultural content, therefore free will is not a psychological universal. Researchers have warned against the use of WEIRD participants, as these subjects are often outliers when situated within the wider human population, and might well be the least representative population for making generalisations about human psychology (Henrich et al., 2010). Hence, it should be noted that although there was some cross-cultural evidence presented in the current review, our conclusions may be restricted to folk's conceptions of free will in WEIRD regions.

Given relatively limited studies with non-WEIRD samples, we encourage more studies with non-WEIRD samples (including participants from Asia, Africa, and South America) and more cross-cultural studies. Cross-cultural studies can be done through Big Team Science methods, which involve large many-regional networks with participants from multiple dozens of regions and often have massive sample sizes (Coles et al., 2022), such as Psychological Science Accelerator (Moshontz et al., 2018). Such many-regional studies can examine the replicability, generalizability and potential cross-cultural differences (Forscher et al., 2023).

Moreover, as illustrated by our exploratory correlation analysis[13], a key advancement in the free will conceptions literature is that increase of sample sizes in more recent years, perhaps because some psychologists have improved their practices due to heightened awareness of the replication crisis (Nosek et al., 2022.). Notably, two studies published in 2019 and 2020 respectively had sample sizes of over one thousand participants (Cracco et al., 2020; Wisniewski et al., 2019). We appreciate these efforts and look forward to more large sample size studies, ideally across various cultures and demographic groups.

Further, many studies did not report effect sizes[14], demo-

[12]We appreciate the peer reviewer Prasad Chandrashekar for the important and helpful suggestion of adding more discussions regarding future research directions.

[13]We thank the reviewer Prasad Chandrashekar for the important suggestion regarding the possible association between year of report and sample size

[14]Although it is often feasible to estimate or calculate effect sizes based on statistics such as means and standard deviations or standard errors if they are reported, we strongly recommend researchers to report effect sizes to enhance better understanding of magnitude of effects for the readers and facilitate future meta-analyses (Jané et al., 2024). We thank Prasad Chandrashekar for the comment, which motivated us

graphics such as ethnicity and education were often incomplete, and there were limited replications within the literature. The recent review and direction paper by St Quinton et al. (2023) discussed the failed replications in the free will belief literature (e.g. Genschow, Hawickhorst, et al., 2021; Katzir and Genschow, 2022). The presence of failed replications illustrate the importance of replications in the free will literature, for both experimental and correlational studies (St Quinton et al., 2023). To ensure that the conclusions drawn are robust, more direct and conceptual replications of the reviewed studies from different labs, as well as more non-WEIRD, cross-cultural, and cross- linguistic investigations of the phenomena under review are needed.

Finally, an issue of most studies reviewed in the literature is that they are not pre-registered[15]. Most non-registered studies showed mostly significant findings, but dominance of mostly statistically significant results may be due to publication bias (see review by Nosek et al., 2022). We strongly encourage pre-registration of future studies and transparent reporting of results regardless of significance or non-significance in effects (Nosek et al., 2022).

Strengths and Limitations of the Review

This is the first systematic review of psychological evidence on folk conceptions of free will. Whilst we did not address the causes and consequences of free will beliefs, which are outside the scope of our paper, the current review could complement a meta-analysis registered report of outcomes associated with free will beliefs currently being conducted by Nanakdewa et al. (2020).

Several limitations in our systematic review should be acknowledged. Due to the dissertation nature of this research, there was only one reviewer, and the results were potentially affected by selection and reporting errors and biases. Additionally, the records were limited to the English language, and only one eligible study collected data in a non- English language. Further, there was no suitable and validated tool available as of the time of writing for risks of bias and quality assessment. Nonetheless, this systematic review adopted an open science approach, as a pre-registered study with a predefined search strategy and inclusion/exclusion criteria to minimise biases, and open data to enhance the transparency and reproducibility of findings. We invite researchers in the field to review the coding and data, all suggestions are welcome.

Conclusion

The present systematic review surveyed the current state of knowledge on folk conceptions of free will in psychology to offer insights into the contents of lay concepts and beliefs about free will. The results showed that for laypeople, especially the more educated population from the United States, free will is a dynamic construct centred on the ability to choose following one's goals and desires, whilst being uncoerced and reasonably free from constraints. There was no consistent evidence indicating metaphysical considerations about consciousness, dualism, or determinism. Although more evidence from replications, cross- cultural and cross-linguistic research are needed to draw a strong conclusion, we found preliminary support for a psychological model of folk conception of free will. Future research should explore the distinction between having free will and having the ability to exercise free will in vignette experiments, and further investigate the potential pathways mediating the effects of consciousness and dualism on free will attributions. We encourage scholars to take the folk concept into account when making assertations about the existence of free will.

Transparency

All versions of the pre-registered protocol, search results, coding of abstract and full- text screening decisions, and extracted data are available on OSF (https://doi.org/10.17605/OSF.IO/2T67Z) Alison Lam received no funding for this project. The author acknowledges that she had received help from study author Gilad Feldman during the planning stage of this project. Nonetheless, Feldman had no discernible advantage in study inclusion to influence the results of this review, as study selection was based on pre-registered inclusion/exclusion criteria, and abstract screening on ASReview was anonymised.

Potential Conflicts of Interests and Funding

The first author (Alison Lam) submitted the manuscript in 2021, as the only author. One of the peer reviewers was Prasad Chandrashekar, who does not and did not have any collaborative relationship with Alison Lam. The manuscript was conditionally accepted but had not been published since Alison Lam has since left academia and did not have time to finalize the paper. Alison Lam then invited Siu Kit Yeung to join as the second author in 2024 to finalize the manuscript. Siu Kit Yeung provided extensive comments and suggestions to the systematic review in 2020 and 2021, responded to the reviewers' comments, and made some changes to the manuscript in 2025. Siu Kit Yeung had collaborated with Prasad Chandrashekar, one of the peer reviewers multiple years ago and published a paper regarding belief in free will together (Chandrashekar et al., 2021), but they do not collaborate with each other nowadays. We report such information to be transparent and we are uncertain if this is considered as conflicts of interests or not.

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to explain why reporting effect sizes can be helpful.

[15]We thank the peer reviewer Prasad Chandrashekar for suggesting us to discuss statistical significance of findings of registered and non-registered studies.

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Author Contributions

The first author was responsible for conceptualization and designing the systematic review, screening and coding studies, and writing the initial draft of the systematic review. The second author was responsible for providing feedback and suggestions during the conceptualization and design stages, and making changes based on peer reviewers' feedback and suggestions as well as more updated papers, to finalize the paper.

Open Science Practices

This article earned the Preregistration, Open Data, Open Materials, and Open Code badge for preregistering the hypothesis and analysis before data collection, and for making the data, materials, and code openly available. It has been verified that the analysis reproduced the results presented in the article. The entire editorial process, including the open reviews, is published in the online supplement.

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Appendix
Deviations from the Pre-registered Protoco

In Version 2, the protocol was updated to elucidate the inclusion criterion of psychological research. Since this project is a psychology dissertation intended to provide a systematic review of psychological research, as specified in the original pre-registered inclusion criteria, experimental philosophy studies were to be excluded. Although many experimental philosophy studies on folk intuitions about free will were published in psychology journals and attempted to identify the underpinnings of conflicting notions about free will (Knobe et al., 2012), there is a methodological distinction between experimental philosophy and psychological studies on free will beliefs (Feldman & Chandrashekar, 2018). Experimental philosophy also aims to solve philosophical problems, such as whether people consider free will to be compatible with determinism (Nichols, 2011), which are outside the scope of this dissertation and the expertise of the student reviewer. As Nahmias (2006) pointed out, the results of experimental philosophy could be interpreted in varied ways and often represent conflicting intuitions, that "these issues are complex and difficult and require the reflective consideration of well-trained philosophers (p.236)." Additionally, due to technical difficulties with Endnote Online in removing duplicate records, the desktop version, Endnote X9, was used instead as the reference manager and for duplicate removal.

In Version 3, the protocol was updated to revise the date of database search rerun from October 31, 2020 to October 22, 2020, due to time constraints. Accordingly, the cut-off date for data collection of unpublished manuscripts from author response was changed to November 19, 2020, to allow for the 4-week window for contacting authors.

In addition, inspired by the suggestion by the reviewer Prasad Chandrashekar, we conducted a non-pre-registered analysis on the correlation between the number of years ago and the sample size, to test if more recent studies tend to have larger sample sizes. The results are reported in the main manuscript.

Table A1

Supplementary Materials Obtained via Personal Communication

Authors	Data provided
Emiel Cracco	Ethnicity, education, political attitude, religiosity, and religion of participants in Cracco et al. (2020)
Michael Ent	Inaccessible article: Ent and Carson (2018)
Gilad Feldman	Source of participants in Study 1; country of participants in Study 1, 3 and 4 in Feldman et al. (2014)
	Unpublished manuscripts: Chandrashekar et al. (2020); Fillon et al. (2019)
Matthias Forstmann	Country, education, and political attitude of participants in Forstmann & Burgmer (2018)
Kimberly R. Laurene and Richard F. Rakos	Mean age and *SD* of high school participants in Rakos et al. (2008)
Stephan Lau	Education of non-students, ethnicity, and source of participants in Study 3 in Vonasch et al. (2017)
Andrew E. Monroe	Country of participants in Monroe et al. (2014)
	Sample size in Study 2 and 3; Raw data and analysis syntax in Monroe and Malle (2014)
Jason Shepard	Country, education, and source of participants in Shepard & Reuter (2012)
Matthew Taylor	Total sample size in Study 1 and country of participants in Study 2 in Taylor et al. (2020)
Andrew J. Vonasch	Mean age and *SD* of participants in Study 1; *SD* of mean age of participants in Study 2 in Taylor et al. (2020)
	Mean age and *SD*, and ethnicity of participants in Study 2, 3, 4a and 4b; education, political attitude, and religiosity of participants in Study 2; country of participants in Study 4a and 4b; clarification of limitation in Study 1; and raw data in Vonasch et al. (2018)
	Mean age and *SD*, ethnicity, and country of participants; and raw data in Study 2 in Vonasch et al. (2017)
	Unpublished manuscript: Taylor et al. (2020)
David Wisniewski	*SD* of mean age, and education of participants in Wisniewski et al. (2019)