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Investigating the Potential Causal Relationship Between Free Will Belief and Well-Being

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctorate of
Philosophy in Social Psychology at Virginia Commonwealth University

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Abstract

This multi-study dissertation had four primary aims. My first was to add to the evidence base indicating a positive association between free will belief (FWB) and subjective well-being (SWB). My second aim was to develop a measure to assess the FWB theme referred to as *the principle of alternate possibilities* (PAP). To achieve the first two aims, I conducted two cross-sectional studies to further establish the FWB-SWB association and start the development and assessment of a new PAP FWB measure. In the first study (N=995), I hypothesized that an EFA of the new PAP items would produce at least a single factor structure and that FWB would be a positive predictor of SWB. Study 1 was successful, the EFA extracted a single PAP factor with 10 items and FWB was shown to positively predict SWB. The second study (N=760) was an exact replication of the first. Study 2 was also successful, replicating the single factor structure for the preliminary 10-item PAP measure as well as the positive association between FWB and SWB. Study 3 was a short-term longitudinal study providing further psychometric assessments of PAPS-10. Study 3 found that the PAPS-10 was temporally stable and distinct for a host of related constructs. The third aim of my project was to provide a theoretical framework for understanding the FWB and SWB relationship. To achieve this, I developed the purpose-imbuing model of FWB. The model posits that the primary function of FWB is to imbue people's lives with meaning, and by so doing establish adaptive well-being. Finally, and most importantly, the fourth aim of my project was to experimentally test the propose-imbuing model of FWB and determine if the FWB and SWB relationships were causal. For Study 4, I used a 3 (anti-FWB vs. pro-FWB vs. control) X Continuous (meaning in life) between-groups experimental design to manipulate FWB and assess its downstream effects on meaning in life and both eudainomic and hedonic well-being. I hypothesized that a pro-FWB manipulation would result in more adaptive

eudainomic and hedonic well-being (compared to a control) due to the manipulation bolstering perceived meaning in life (compared to a control). I also hypothesized that an anti-FWB manipulation would result in less adaptive eudainomic and hedonic well-being (compared to a control) due to the manipulation diminishing perceived meaning in life (compared to a control). All primary hypotheses of Study 4 were confirmed. The results and their implications are discussed in detail.

Keywords: Free Will Belief, Well-Being, Worldview, Purpose/Meaning in Life

Investigating the Potential Causal Relationship Between Free Will Belief and Well-Being

Just over 30 years ago, Christopher McCandless, “*a young man from a well-to-do East Coast family hitchhiked to Alaska and walked alone into the wilderness north of Mt. McKinley. Four months later his decomposed body was found by a party of moose hunters*” (Krakauer, 1996, p. 1). A few years earlier, McCandless, graduated from Emory University but was radically discontent. Fueled by this discontentedness, McCandless gave his entire savings to charity, abandoned nearly everything he owned, and set out to find a life worth living. Although his search for a life worth living unfortunately led to his death, he ultimately succeeded in what he set out to do. Starved, poisoned, freezing, and in full knowledge of his rapidly approaching death, McCandless wrote his last words: “*I have had a happy life and thank the Lord. Goodbye and may God bless you all!*”

The McCandless story highlights the unique human endeavor placed before all persons; that of the good life. For centuries, humans have contemplated and strived for the good life. Indeed, the prime goal of most of the world’s religious traditions—from the ancient wisdom of Siddhārtha Gautama to the teachings of Jesus of Nazareth—is to direct people to the good life and the well-being it brings. In the USA, the cultural value placed on individual well-being is evidenced in the preamble of the Declaration of Independence by declaring that all persons have a right to “*Life, Liberty and the pursuit of Happiness*” (1776).

It is difficult for any serious student of psychology to identify a single outcome of importance not of relevance to well-being. Indeed, the canon of psychological science is a collection of knowledge regarding states of ill-being and well-being, methods for its study, and recommendations for its attainment. Though indicators of psychosocial well-being (e.g., life satisfaction) are no doubt prudential goods in and of themselves, they gain even more importance

as significant predictors of decreased disease and mortality (Cohen et al., 2016; Rozanski et al., 2019; Zhang & Han, 2016).

Although the subject of less empirical attention, psychological science investigating the predictors and antecedents of well-being has also grown over the past few decades. This research has indicated social and psychological factors such as belonging and meaning in life as important predictors and antecedents of well-being. So fruitful was this research that both factors are theorized as primary social and psychological needs, of which the satisfactions are nearly universally agreed upon by scholars as necessary for one to attain adaptive levels of well-being (Baumeister, 1991; Baumeister & Leary, 1995; Diener and Seligman, 2004; Ryan and Deci, 2001; Ryff and Singer, 1998; Steger, 2009; 2012; 2017).

More recently, research has indicated the potential of one's free will belief for predicting their level of well-being. People who more strongly believe in free will, as opposed to those portraying perfunctory or antagonistic beliefs on the topic, are more likely to report more adaptive levels of well-being (Zhao & Huo, 2022). However, the evidence base for the association between free will belief and well-being is scant and relatively atheoretical. To remedy these, the focal aims of this multi-study research program were: 1) to add to the evidence base indicating associations between free will belief and well-being; 2) to develop a measure of free will belief designed to capture the free will theme known as the *principle of alternative possibilities*; 3) to provide a substantive theoretical framework for understanding free will belief, meaning in life, and well-being as a nomological network; and 4) to experimentally investigate this newly developed theoretical framework, wherein the causal path of free will belief to meaning in life to well-being is put to the test.

The Conceptual Landscape of Well-Being

The science of well-being has come to differentiate between two distinct dimensions of well-being, those of hedonic well-being and eudaimonic well-being (Boehm & Kubzansky, 2012; Hernandez et al., 2018; Ryff, 2017; Steptoe, 2019). The hedonic dimension of well-being is that which incorporates one's feelings of happiness and experiences of pleasure and pain. The eudaimonic dimension of well-being is that which incorporates one's feelings of achieving self-realization and one's overall sense of life satisfaction. Both well-being dimensions enjoy significant conceptual support, with the vast majority of well-being scholars in agreement over their conceptual legitimacy.

Well-Being, Meaning in Life, and Free Will Belief

Meaning in Life as a Predictor and Antecedent of Well-Being

Literally hundreds of studies have provided evidence that meaning in life is related to less suffering and more well-being (Steger, 2012). Greater meaning in life is associated with greater positive emotions, vitality, and satisfaction with life (Chamberlain & Zika, 1988; Kennedy et al., 1994; Keyes et al., 2002; King et al., 2006; Ryff, 1989; Steger & Frazier, 2005; Steger & Kashdan, 2006; Steger et al., 2006; 2008; 2015; Zika & Chamberlain, 1992). Also, meaning in life has been evidenced as being positively associated with happiness and positive life adjustment in many countries (Bonebright et al., 2000; Debats, 1996; Debats et al., 1993; Fry, 2000, 2001; Garfield, 1973; O'Conner & Vallerand, 1998; Reker, 2002; Reker et al., 1987; Ryff & Keyes, 1995; Scannell et al., 2002; Shek, 1995; Shin et al., 2005; Thompson et al., 2003; Wong, 1998; Zika & Chamberlain, 1987; 1992).

The Meaning of Meaning in Life

As a psychological construct, meaning or meaning in life as it is often referred, is an umbrella term that also incorporates notions like significance and purpose in life. The conceptual

definition that has garnered the most consensus states that meaning is “*the extent to which people comprehend, make sense of, or see significance in their lives, accompanied by the degree to which they perceive themselves to have a purpose, mission, or overarching aim in life*” (Steger, 2009, p. 682). Much of the literature describes meaning in life as a tripartite psychological construct (George & Park, 2016; Hanson & VanderWeel, 2012; Heintzeman & King, 2014; Hick & King, 2009; King Heintzeman, & Ward, 2016; Martela & Steger, 2016). The first component is a cognitive that serves the primary function of making sense of one’s life. This component is often referred to as *coherence*. While also cognitive, the second component is largely an affective one that serves the primary function of imbuing value and importance into a person’s life. This second component is often referred to as *significance*. Lastly, the third component is a motivational one which serves the primary function of leading a person into the pursuit of purpose. This third component is often referred to as *purpose*. Given these three components, the core concept of meaning in life is that it “*captures the human capacity to make sense of life (coherence component), to pursue purpose (purpose component) and to lead a life that is worthwhile and important (significance component);*” parenthetical notes are my own (Steger, 2009, p. 682). It is also important to make explicit the implicit inherent temporal differences between the three components of meaning (Steger, 2012; 2016). The temporal focus of coherence can be on the present but is primarily focused on making sense out of a person’s past, or their past on up to their present. The temporal focus of significance is the opposite. While it does indeed take memories into account, significance is primarily about the value and importance a person feels their life currently has. The temporal focus of purpose is future oriented as it is primarily about a person’s quest to find purpose or achieve a goal that is thought to bestow meaning in their life.

Measuring Meaning in Life

The Meaning in Life Questionnaire (MLQ; Steger et al., 2006) is currently the most used psychometrically valid measure of meaning (Brandstätter et al., 2012; Heintzelman & King, 2014). The psychometric properties of the MLQ have been well validated and with large cross-national samples (e.g., Steger et al., 2008; Steger & Samman, 2012; Steger & Shin, 2010). The MLQ assess the degree to which people perceive their lives to have meaning and the degree to which people feel that they are searching for more meaning in their lives (Steger et al., 2008, 2011).

Free Will Belief as a Predictor and Antecedent of Meaning and Well-Being

An emerging scientific literature suggests that free will belief is an important factor for meaning in life and a significant predictor of well-being. Correlational studies have found a positive association between free will belief (hereafter, FWB) and meaning in life, such that, people with stronger FWB tend to also report greater perceived meaning in their lives (Alquist, Ainsworth, & Baumeister, 2013; Moynihan, Igou, & van Tilburg, 2017; 2019). Experimental research has shown that when inducing people to disbelieve in free will they are more likely report a greater degree of meaninglessness than people not induced to such a disbelief in free will (Moynihan, Igou, & van Tilburg, 2019). The empirical connection between FWB and meaning in life is rather intuitive considering the core conceptualization of meaning in life as “*the human capacity to make sense of life, to pursue purpose and to lead a life that is worthwhile and important*” (Steger, 2009, p. 682). Implicit in this conceptualization lay the notion of free choice. For a person would need to choose to *pursue* something, as well as choose to act in accordance with their idea of *worthwhile* and *important*.

Research has also indicated a positive association between free will belief and subjective first-person reports of well-being (hereafter, SWB). Specifically, more adaptive levels of SWB indicators (e.g., life satisfaction) have been observed amongst people with stronger FWB (Collier & Shi, 2020; Kondratowicz-Nowak & Zawadzka, 2018; Li et al., 2017; Li & Wong; 2020; Moynihan, Igou, & van Tilburg; 2017). Moreover, recent longitudinal research has provided preliminary evidence suggesting a potential causal relationship between FWB and SWB. Specifically, a cross-lagged study design revealed that stronger FWB led to more adaptive SWB outcomes for people, but not in the opposite direction (Zhao & Huo, 2022). This is the closest the field has come to answering the causal question. However, a prior study using a similar design methodology did not find this association (Gooding, Callan, & Hughes, 2018). Although it is important to note that the study finding no such association used a single-item measure of unknown validity and reliability to assess FWB. A weakness not shared by Zhao and Huo's (2022) work evidencing the potential causal path of stronger FWB leading to more adaptive SWB outcomes. However, what exactly is free will and what do folks believe about it?

The Science of Free Will Belief: From Philosophy to Psychology

In his seminal work, *Are We Automata?* (1879) the founder of American psychology, William James, argued that a rich capacity for free choice was a necessary but not sufficient condition of leading a meaningfully ethical life. James proclaimed, "*the problem of man is less what act he shall now choose to do, than what being he shall now resolve to become*" (1879, p.13). In his usual form of sharp literary rhetoric, he draws the reader into the meaningful—now referred to as the existential—problem of free will. For James, free will was not important for the present moment in and of itself. Rather, free will was important for one's ethical character development which then imbues one's choices in the present moment with great meaning. From

this mindset comes another example of Jamesian free will rhetoric, “*my first act of free will shall be to believe in free will*” (1884). James’ proclamations were bold ones and were by no means any less controversial then than they would be today, given the popularity of psychodynamic theory and its affinity for Schopenhauerian determinism (aka soft determinism, compatibilism).

The question of metaphysical human freedom, or free will, is a perennial one. Each generation must ask this question for themselves and reflect on its ever-elusive answer. While the fact of matter regarding the existence of free will is a metaphysical one—and therefore beyond the reach of scientific verification—the scientific investigation of its *belief* and the potential psychological affordances and consequences of such a belief are entirely proper (Baumeister, 2008; Baer, Kaufman & Baumeister, 2008). Indeed, a cumulating body of literature in social psychology agrees.

The Definition of Free Will in Psychological Science

Belief in free will is often assumed within the wider body of literature to be synonymous with personal control beliefs such as locus of control and the phenomenological sense of agency in day-to-day experience. To be clear, the belief in free will is indeed associated with locus of control and agency (Abbott, 2017). However, empirical evidence has shown these associations to be too weak to argue the constructs as redundant (Paulus & Carry, 2011; Carry & Paulus, 2014). The common confusion of the belief in free will with other facets of personal control beliefs familiar to psychology exemplifies the importance of providing clear definitions of the range of free will beliefs.

While the specific definition of free will differs between distinct philosophical schools of thought, it is near universally agreed upon that free will is to be thought of as a metaphysical phenomenon applying to all persons endowed with reasonable cognitive faculties (James,

1899/2014; Van Inwagen, 1975, Dennett, 1984, Kane, 1998, Baumeister, 2008). The psychological definition of free will that is used in the present research is provided by an interdisciplinary group of researchers who define the construct as *the capacity for free action* (Haggard, Mele, O'Connor, & Vohs, 2010). However, what does it mean for an action to be free? Bringing more conceptual clarity to this definition, Baumeister and Monroe (2014) further distinguish free action with two pertinent themes: (1) the possibility of multiple courses of action stemming from the same present, and (2) an intentional action based on informed, rational deliberation by an agent who is not externally coerced to make a particular choice. The first theme has been referred to as the *principle of alternative possibilities* (hereafter, PAP), as well as the *ability-to-do-otherwise* (Van Inwagen, 1983; Kane, 1998). The second theme has been referred to as *volition* (Dennett, 1984; Sartorio, 2015). Therefore, any psychological study of FWB must assess people's beliefs and/or perceptions regarding one or both aspects of free will belief (i.e., PAP and/or volition).

How is FWB different than locus of control? A key difference between FWB and LOC can be found in the subject matter of the constructs themselves (i.e., their aboutness). Specifically, locus of control (hereafter, LOC) is a psychological construct for which the primary subject (i.e., the aboutness) directly refers to the self. LOC refers to the degree to which a person feels outcomes in their life are contingent upon their own behavioral control vs. randomness and/or the control of powerful others (Rotter 1966; Levenson, 1972). LOC is therefore primarily about and directly in reference to one's self-concept. This is contrasted by one's belief in the metaphysical phenomenon of free will. A belief for which the primary subject is the nature of reality, not the self. Just as theism and atheism are beliefs about the nature of reality rather than the self, so too is that the case for FWB.

To be clear, this work takes no interest whatsoever in which FWB theme (i.e., volition vs PAP) is most crucial for the existence or nonexistence of a freedom permitting universe nor humans' ability to acquire whichever freedom should it exist. To argue the goings-on of these themes as they related to reality (i.e., their truth value) is the province of philosophers. And rightly so. This work neither cares about the ontological status of free will (i.e., its truth value) nor its compatibility or incompatibility with a deterministic universe. Another metaphysical question for which this work is also agnostic.

For the remainder of this work, PAP will be the preferred term for referring to the notion of free will (i.e., rather than the ability-to-do-otherwise). Although both terms refer to the same notion of free will, the ability-to-do-otherwise is mostly used within the philosophical literature; often whilst referring to the nature of its truth value. Though used less within the psychological literature, when the term for this notion of free will belief is discussed, it is more likely to be referred to by PAP. This work seeks to remain consistent with this sensible established norm.

The Psychometrics of Free Will Belief

Several measures of FWB have been developed. However, most of these measures are ill-conceived, attempting to assess FWB with items that have too much overlap with related yet distinct constructs, such as locus of control and one's subjective sense of agency. As previously discussed, two core themes of FWB are the belief in PAP and the belief in volition. Therefore, any measure of FWB must be able to assess people's beliefs regarding one or both FWB themes. However, only the volition FWB theme is measurable as a measure for the PAP theme of FWB has yet to be developed.

The Free Will and Determinism Scale (FAD-Plus). The most widely used FWB measure is by far the FAD-Plus (Paulhus & Carey, 2011). This FWB instrument was developed

to assess lay beliefs of free will rather than the beliefs regarding the complex philosophical distinctions of free will. The measure has been described as capturing a simplified-lay version of the FWB theme known as volition (Baumeister & Monroe, 2014; Feldman, Baumeister, & Wong, 2014; Paulhus & Carey, 2011). The construct validity of the measure has been assessed and challenged several times (the FAD-Plus is the fourth iteration of the measure). While the free will subscale portion of the measure was published containing 7 items, researchers objected to 3 items in the measure that are, on face, conflated moral responsibility with FWB. It is now common, indeed recommended, to use the free will subscale of the FAD-Plus in a paired down 4-item form that excludes the moral responsibility items (Nadelhoffer et al., 2014). In its current form and use, the FAD-Plus enjoys satisfactory levels of construct validity and reliability (both test-retest and internal; Nadelhoffer et al., 2014; Paulhus & Carey, 2011).

What About Measuring PAP? While the FAD-Plus gives researchers the ability to assess the volition theme of FWB, the other key FWB theme known as PAP remains untapped. The lack of a valid and reliable measure of the PAP theme of FWB serves to be a large gap in the science of FWB in two crucial ways. First, the assessment of FWB, if the status quo persists, will always be one that is error inflated. Specifically, if key themes of any psychological construct are left out of the primary assessment tools of those constructs, said assessment tools are then known to be error inflated. Second, the science of FWB has a methodological flaw that can always be used as a reason for not finding or replicating hypotheses.

Experimental Manipulations of Free Will Belief

Two FWB manipulations have been used to experimentally assess the consequences of FWB. In the first method (Vohs & Schooler, 2008) participants are randomly assigned to read one of two passages from Francis Crick's famous book, the *Astonishing Hypothesis* (1994). In

an anti-FWB condition, participants read a passage arguing that the reality of free will as impossible given scientific knowledge. In a neutral/control condition, participants read a passage from the same book that makes no mention of free will. The second FWB manipulation method (Vohs & Schooler, 2008) used a Velten-like technique (Velten, 1968), wherein participants are instructed to read, reflect upon, and then rephrase a set of statements that either support or oppose the concept of free will. Other researchers (e.g., Alquist et al., 2013; 2014; Baumeister et al., 2009) then added a control condition to the Velten-like technique, wherein participants read, ponder, and then rephrase a set of statements about nature. In its complete form (i.e., pro-FWB, anti-FWB, and control conditions) the Velten-like FWB manipulation technique randomly assigns participants to experience either the pro-FWB, the anti-FWB, or the control condition. People in the pro-FWB condition read, reflect upon, and then rephrase statements such as, “I am able to override the genetic and environmental factors that sometimes influence my behavior” and “Avoiding temptation requires that I exert my free will.” People in the anti-FWB condition read, reflect upon, and then rephrase statements such as, “Science has demonstrated that free will is an illusion” and “Everything a person does is a direct consequence of their environment and genetic makeup.” Lastly, people in the control condition read, reflect upon, and then rephrase statements such as, “Monarch butterflies fly slowly but have been sighted hundreds of miles at sea” and “Half a day’s boat ride away from Athens lies the isle of Mykonos.”

The construct validity of Velten-like FWB manipulation technique has been inferred through qualitative and quantitative assessments. Initial validation studies using exit interviews indicated that participant FWB was sufficiently augmented in the intended directions of the manipulation conditions (Baumeister, Mele, & Vohs, 2010; Vohs & Schooler, 2008). Initial validation studies also used a pseudo known-groups paradigm showing that FAD-Plus scores

were significantly predicted by the FWB manipulation groups and in the intended direction (Baumeister et al., 2009; Baumeister, Mele, & Vohs, 2010; Vohs & Schooler, 2008). With higher FAD-Plus scores found for the participants in the pro-FWB condition compared to the other conditions, and lower FAD-Plus scores found for the participants in the anti-FWB condition compared to the others. The FAD-Plus is now often used as a manipulation check in studies manipulating FWB (Genschow et al., 2021; Schooler, Nadelhoffer, Nahmias, & Vohs, 2014). Nearly 150 experimental studies (Genschow et al., 2021) have implemented the Velten-like FWB manipulation technique, to investigate the interpersonal and social-cognitive consequences of FWB.

The Social Cognition of Free Will Belief

FWB has been shown to have important effects on a variety of social-cognitive outcomes. Most studies have revealed negative effects for the denial of free will and positive or even prosocial effects for its acceptance. Specifically, FWB has been shown to increase gratitude and forgiveness towards study confederates, increases in helping behaviors within quasi-experimental good-Samaritan paradigms, increased volunteerism for prosocial causes, and increased levels of self-control (MacKenzie, Vohs & Baumeister, 2014; Nahmias, 2007; Baumeister, Masicampo & DeWall, 2009; Baumeister, Sparks, Stillman & Vohs, 2008). Moreover, studies that have induced a disbelief in free will condition have shown that its denial increases aggression, scholastic cheating behaviors, and significant reductions in the prosocial effects mentioned above (Vohs & Schooler, 2008; Baumeister, Masicampo, & DeWall, 2009). However, not all the evidence shows prosocial effects. Studies by Pronin and Kugler (2010) provide evidence of a self-serving free will bias, such that, people tend to see themselves as possessing greater amounts of free will than others; this finding gives one pause when

considering the evidence regarding moral and legal judgments. Clark and colleagues (2014) found that high free will believers are more likely to judge the moral failings of others harshly and more likely to advocate for stricter sentencing of criminal misdemeanors. Other research is complementary to this, find that a mechanistic (i.e., less agentic) view of the world reduces punishment and retribution motives (Shariff et al., 2014).

A large scale meta-analytic project (Genschow et al., 2021) aimed at replicating much of the social-cognitive effects of FWB discussed above has largely resulted in contradictory or vague findings. Specifically, the suggestion that FWB leads to pro-social behavior (or the anti-free will belief leads to less pro-social behavior) did not replicate in the majority of the studies. The same failure to replicate across several studies was also found for the work suggesting that FWB leads to retributive justice and increases to punishment severity and duration. However, while this meta-analytic work was not able to replicate the outcomes previously demonstrated for FWB, it did provide a robust demonstration of the reliability Velten-like FWB manipulation technique. Specifically, in nearly all 145 experimental studies that were included in this meta-analysis, the Velten-like FWB manipulation led to reliable differences in FAD-Plus scores with effects sizes ranging between the smaller to larger ends of medium effects (Genschow et al., 2021).

Theoretical Framework for the Free Will Belief and Well-Being Relation

Although psychological research in the interpersonal effects of FWB saw increased attention in the past few decades, a dearth of research exists regarding the *intrapersonal* effects of free will beliefs. Does FWB offer its adherents psychological benefits or harms? Past research suggests that people with greater internal locus of control, sense of agency, and autonomy are also likely to have greater self-esteem, self-efficacy, and adaptive self-concepts. All of which

have been associated with positive SWB outcomes (Moynihan, Igou, & van Tilburg, 2017; Yanchar, 2017; Ryan & Deci, 2000; Lyubomirsky, Tkach, & DiMatteo, 2006; Caplan & Schooler, 2003). Might the same also be true of FWB?

As previously discussed, a small program of research has indicated just that, reporting positive associations between FWB and SWB. Specifically, people with stronger FWB have been found to also have more adaptive levels of SWB (Collier & Shi, 2020; Kondratowicz-Nowak & Zawadzka, 2018; Li et al., 2017; Li & Wong; 2020; Moynihan, Igou, & van Tilburg; 2017). Also, recent longitudinal research has provided preliminary evidence suggesting a potential causal relationship between FWB and SWB using a cross-lagged design methodology (Zhao & Huo, 2022). However, another study using a similar cross-lagged methodology found no effect (Gooding, Callan, & Hughes, 2018). It is clear that replication and more rigorous assessments of the FWB to SWB causal pathway are needed.

Another primary weakness of the current state of the FWB on SWB research program is its lack of meaningful theoretical grounding. This research seeks to remedy this fact by first drawing on the evolutionary psychology of FWB (suggesting that FWB is likely of some psychologically adaptive fitness) and then positing a worldview-conflict model of FWB.

Evolutionary Accounts of Free Will Belief

Free Will Belief as an Evolutionary Byproduct. One evolutionary perspective of human free will dually posits 1) the existence of free will as a legitimate human capacity, and 2) rather than being directly selected for, the human capacity for free will is merely an emergent property of more fundamental capacities that were directly selected for. From this perspective, the veridical first-person experience of free will is cumulative result of capacities such as self-consciousness, attention, mental time travel, and self-control (Grinde, 2022). Regarding the

ontological legitimacy of human free will, Grinde (2022) proposes that the first-person experience of free will approximately comports with reality, after accounting for the particulars of person-situation interactions. While this theory may provide an explanation for how legitimate human free will may have emerged, the usefulness of this theory for empirical research is unclear at best. The two primary claims of the theory are seemingly unfalsifiable, as the truth value of free will's existence is a question for metaphysics, and the ability to observe the evolution of capacities such as self-consciousness would (at the very least) require a time-machine. Cheekiness aside, the evolutionary byproduct account of free will seemingly has zero utility for generating hypotheses about FWB and its adaptive functions.

The Cultural-Animal Framework of Free Will Belief. As posited by Baumeister (2008), human evolution selected for a new (in the purview of evolutionary history) and more complex form of action control marked by self-control and rational choice. Moreover, these newly evolved capacities (i.e., self-control and rational choice) psychologically correspond to FWB and are also highly adaptive, especially for functioning within culture. This theory, while general and nonspecific, offers a simple and coherent claim—FWB exists because it is socially and psychologically adaptive. From the perspective of the cultural-animal model, FWB serves to bolster perceptions of behavioral control and agency, as well as engaging in future-mindedness planning, and self-control (Baumeister, 2008; Baumeister et al., 2009). Clearly, this model is useful for generating testable hypotheses regarding the adaptive functions—either interpersonal or intrapersonal—of FWB.

Conceptualizing a Purpose-Imbuing Model of FWB on SWB

The theoretical model of FWB formulated here is the result of synthesizing the ideas of key philosophers from the turn of the century (Camus, 1942; Heidegger, 1927; Sartre, 1943,

1946) to modern day (Pereboom, 2014; Smith, 2005) with the empirical data from the science of FWB and meaning in life. There are two core premises of this model: 1) the primary intrapersonal function of FWB is to imbue a person's life with meaning, and 2) the adaptive function of FWB is wholly due the meaning afforded by FWB. Furthermore, purpose-imbuing model FWB is consistent with the cultural-animal framework of FWB and explicitly formulated to expound upon the cultural-animal framework of FWB. Such that, the purpose-imbuing model posits the existence of two distinct primary routes for the adaptive benefits of FWB. The first route is explained by Baumeister's (2008) cultural-animal framework. This route is the direct route for FWB and positive psychosocial adaptivity. The second route is explained by the purpose-imbuing model of FWB formulated here and is the indirect route for FWB and positive psychosocial adaptivity. Therefore, while the purpose-imbuing model assumes the truth of the cultural-animal framework, but there is no need to assume the reverse. Specifically, the cultural-animal framework is acknowledged here as independent of the purpose-imbuing model, whereas the purpose-imbuing model is conceptualized as being an addition to the cultural-animal framework.

Why, however, posit such a purpose-imbuing model of FWB? In my view, such a model makes the most sense of the influential existential works of Heidegger (1927), Camus (1942), and Sartre (1943, 1946), the modern and analytical works of Smith (2005) and Pereboom (2014), as well as the relevant empirical psychological data. Specifically, meaning in life has been found to be related to greater self-control, responsibility autonomy, mastery, and internal LOC (Debats et al., 1993; Newcomb & Harlow, 1986; Reid, 1996; Ryff, 1989; Ryff, 1989; Shek, 2001; Steger et al., 2008; Thompson et al., 2003). All of these are also some of the primary correlates of FWB. Also, greater meaning in life has also been linked to more optimistic orientations toward the

future (Martela, Ryan, Steger, 2017; Mascaro & Rosen, 2005; 2006; Mascaro et al., 2004; Steger & Frazier, 2005; Steger, 2006; Thompson & Pitts, 1993). This is especially noteworthy, as a key aspect of the PAP theme of FWB is also future oriented. Namely the PAP belief in multiple possible futures and courses of action (Baumeister & Monroe, 2016). More importantly, FWB has been directly linked to both meaning in life and SWB. Recent research has found greater perceived meaning in life, as well as more adaptive SWB for among people with stronger, as opposed to weaker, FWB (Alquist, Ainsworth, & Baumeister, 2013; Moynihan, Igou, & van Tilburg, 2017; 2019). Also, experimentally inducing people to disbelieve in free will led to increased perceptions of life as meaningless compared to a control group, indicating a causal relationship (Moynihan, Igou, & van Tilburg, 2019). Furthermore, longitudinal research has provided some evidence of a potential causal relationship between FWB and SWB. Because cross-lagged models have supported the FWB to SWB pathway, but not the SWB to FWB pathway (Zhao & Huo, 2022). I propose that the purpose-imbuing model of FWB parsimoniously explains such findings and also provides specific claims that are falsifiable.

Predictions of the Purpose-Imbuing Model of FWB. The purpose-imbuing model of FWB claims that the primary intrapersonal function of FWB is to imbue life with meaning and that the adaptive function of FWB is due to the meaning afforded by FWB. The model is therefore inherently mediational. Specifically, in its positive formulation, the model would predict that stronger FWB leads to increased meaning in life and that increased meaning in life then leads to more adaptive SWB. In its negative formulation, the model would predict that weaker FWB leads to decreased meaning in life and that decreased meaning in life then leads to less adaptive SWB. This model (see Figure 1, page 92) lends itself to several methodological approaches, but in my view the model may be best tested by both experimental between-groups

designs and longitudinal within-subjects designs. While the formulation and evaluation of the purpose-imbuing model of FWB is central to the aims the present research program, the worldview-conflict model could provide an explanatory challenge to the purpose-imbuing model of FWB. Therefore, the worldview-conflict model and its potential challenge will now be discussed.

The Worldview-Conflict Model of FWB. The worldview conflict model of FWB applies knowledge from the literature of the psychological and behavioral consequences of worldview threat to the role of FWB. When in the face of worldview conflict/ threat, people feel a surge of negative emotions, experience decreased SWB (including increased negative emotion, perceived stress, and anxiety) and express more prejudicial attitudes to worldview-conflicting people and information as a result of the aversive experience of worldview threat (Brandt et al., 2014; Byrne, 1969; Proulx, Inzlicht, & Harmon-Jones, 2012; Simons & Green, 2018). As FWB is a worldview level belief, it is posited that the aversion to worldview-conflicting information (such as the potential threat of a falsified FWB) applies to the worldview level belief of FWB. Therefore, through the lens of this model, perceived conflicts/ threats to FWB should result in reduced SWB, as is the case for other threatened worldviews. Such is the worldview-conflict model of FWB.

The Purpose-Imbuing vs. Worldview-Conflict Accounts of FWB. An important characteristic of the purpose-imbuing model of FWB is its limited scope. The model makes no grander claims than what was state above. The worldview-conflict model is much larger in scope, as it was formulated to explain the theoretically causal connection of worldview level beliefs and subjective well-being (Brandt, Crawford, & Van Tongeren, 2019; Greenberg, Solomon, & Pyszczynski, 1997; Solomon, Greenberg, & Pyszczynski, 1991). The worldview-

conflict model contains two key postulates: 1) stimuli/information threatening to one's worldview results in negative affect (e.g., the state of worldview-conflict), and 2) this aversive state reduces well-being and produces a strong desire for regaining faith in one's worldview. When applied to FWB, the worldview-conflict model states that stimuli/information threatening to one's FWB results in negative affect which reduces SWB. Tension between the models arises when the methodology of an experiment includes the manipulation of FWB (a worldview level construct) and its potential effect on SWB (see Figure 1.2, page 92).

When applied to the experimental manipulation of FWB and its downstream effects on SWB, the models make key predictions that are at odds with each other. The purpose-imbuing model states that FWB leads to adaptive well-being by way of increased levels of meaning in life. Applying the purpose-imbuing model to an experimental framework, wherein FWB is manipulated, would lead to the following predictions: First, an anti-FWB manipulation would, relative to a neutral condition, lead to decreased meaning in life which in turn would lead to decreased SWB. Second, a pro-FWB manipulation, relative to a neutral condition, would lead to increased meaning in life, which in turn would lead to increased SWB.

This is contrasted by the worldview-conflict model which states salient FWB threats result in a cascade of negative emotions leading to decreased SWB. Applying this model to the same between-groups experimental methodology would lead to the following predictions: First, an anti-FWB manipulation would lead to increased negative affect (compared to a control group), which would then lead to decreased SWB (compared to a control group). Second, a pro-FWB manipulation would result in no changes to negative affect or SWB. Why such a prediction for the pro-FWB manipulation? This prediction is stated as such because a majority of the laity

report at least a mildly affirming view of human free will (Baumeister & Monroe, 2016; Paulhus & Carey, 2011), hence no threat could occur.

The tension between the models is found in their predictions for the anti-FWB manipulation. In the case that only the first prediction of the purpose-imbuing model is supported, further adjudication between the models would be needed. Specifically, if the only effect found was the one predicted for the anti-FWB manipulation, whereby an anti-FWB manipulation led to decreased meaning in life (relative to a neutral condition) which in turn led to decreased SWB (again, relative to a neutral condition), one could reasonably claim that the purpose-imbuing model is an inferior explanation of the data than the worldview-conflict model. Ambiguity would then be the ultimate result as either model could explain the data, hence the need for further adjudication. If this effect predicted for the anti-FWB manipulation by the purpose-imbuing model can be shown in the face of controlling for negative affect (i.e., the mediating variable from the worldview-threat model), then that would provide evidence in favor of the purpose-imbuing model of FWB. I propose that this hypothesis is key to defending against the problem of ambiguity and competing hypotheses. See Figure 1.3 on page 93 for a conceptual depiction of the model predictions.

The Current Multi-Study Research Program

The present multi-study project has three overarching aims. The first is to add to the evidence base indicating positive associations between FWB and SWB. Secondly, this work seeks to replicate the more commonly evidenced positive association between FWB and SWB (rather than the lesser indicated no association), thereby providing increased clarity to the evidence base. Thirdly, to provide a substantive theoretical framework for understanding the FWB and SWB connection. A worldview-conflict model of FWB—whereby perceived conflicts/

threats to FWB are theorized to result in reduced SWB—is offered to achieve the third overarching aim of this program of research.

Also, in service of the second overarching aim of the present research program is the goal of developing and validating a new FWB measure designed to assess people's belief of the FWB theme known as PAP. Currently, there is no validated measure of the perennial and potentially psychologically important PAP theme of FWB. This research sought to change that. Study 1 reports the item development process and factor structure of the new PAP measure of FWB, as well as results of a structural equation model assessing the relationship between FWB and SWB. Study 2 is a full replication and extension of Study 1. It reports a replication of the new PAP measure's factor structure, as well as a replication of the FWB and SWB structural equation model (hereafter, SEM).

Study 3 was conducted to, once again, confirm the factor structure of the new PAP measure of FWB and provide more robust assessments of the new PAP measure's reliability and validity. Lastly, Study 4 was a theoretically informed experimental research design that was conducted to assess whether the FWB and SWB relationship is a causal one.

Overview of Study 1

The primary objective of Study 1 was the development of a new PAP measure of FWB and to assess the relationship between the FWB and SWB. In service of the first objective the present study, 27 positive-trait items were created to capture the PAP theme of FWB. PAP has yet to be a construct of serious focus among FWB researchers applying the relevant psychometric devices. This research considers the PAP theme of FWB to be a potentially valuable psychological construct in advancing the science and discourse of FWB.

In service of the other primary focus of this research—assessing the FWB-SWB relationship—several overarching hypotheses informed by the literature were formulated and tested. I hypothesized that greater FWB would predict more adaptive SWB. An online cross-sectional survey method was implemented to assess the following six hypotheses:

H₁: The collection of new PAP items will result in at least one PAP factor.

H₂: The depression, anxiety, and life satisfaction measures will load onto one latent subjective well-being construct.

H₃: The new PAP factor(s) and a commonly used measure of volitional FWB (i.e., FAD-Plus) will load onto one latent FWB construct.

H₄: The latent FWB variable will have a direct and positive relationship with the latent SWB variable.

H₅: Locus of control will have a direct and positive relationship with both the latent FWB and SWB variables.

H₆: The FWB and SWB relationship will remain significant after accounting for the predicted relationships for locus of control.

Study 1: Method

Participants

Survey respondents were undergraduate college students from the greater Richmond, Virginia (VA) area. A total of 1258 people, ranging from 18 to 55 years of age ($M = 19.79$) completed the survey. Respondents were mostly women (69%) and mostly White/Caucasian but reasonably diverse (44%, 23% Black/African American, 14% Asian, 11% Latinx, 8% other). Each person that participated in the study received credits towards a required class participation policy.

Materials and Procedure

The survey was implemented online through SONA Systems, a cloud-based research participant pool, which allows participant recruitment and online survey. After reading a short description of the original study's purpose, each person who chose to take part in the study was presented with an online consenting procedure. Once the participants consented to the study, they were presented with several measures aimed at assessing their FWB and related constructs as well as their self-reported psychological health and well-being.

Measures

Subjective Well-Being

Depression Symptomatology. The Patient Depression Questionnaire (PHQ-9; Spitzer, Kroenke, Williams & Lowe, 2001) was assessed to measure the normative (i.e., non-clinical) levels of depressive symptomatology of participants. The measure has been widely used and has been shown to have a high degree of internal reliability ($\alpha = .87$). Participants rated how often they felt bothered (over the last two weeks) by depressive symptomatology across 9 items on a 4-point scale (1 = Not at all, 4 = Nearly every day). All 9 item/symptoms were responded to under the context of the prompt, "Over the last 2 weeks, how often have you been bothered by the following problems?" The item/symptoms are exemplified by the following: "*little interest or pleasure in doing things;*" and "*feeling down, depressed, or hopeless.*" The mean of all 9 item/symptoms was generated for each participant such that higher scores indicated greater levels of patient depression (present study, $\alpha = .90$, $\omega = .90$).

Anxiety Symptomatology. The Generalized Anxiety Disorder 7-item (GAD-7; Spitzer, Kroenke, Williams & Lowe, 2006) scale was assessed to measure the normative (i.e., non-clinical) levels of anxiety symptomatology of participants. This measure of anxiety has been

widely used and has been shown to have a high degree of internal reliability ($\alpha = .89$). Participants rated how often they felt bothered (over the last two weeks) by anxiety symptomology across 7 items on a 4-point scale (1 = Not at all, 4 = Nearly every day). All 9 item/symptoms were responded to under the context of the prompt, “Over the last 2 weeks, how often have you been bothered by the following problems?” The item/symptoms are exemplified by the following: “*feeling nervous, anxious, or on edge;*” and “*not being able to stop or control worrying.*” The mean of all 7 items/symptoms was then generated for each participant such that higher scores indicated greater levels of participant anxiety (present study, $\alpha = .89$, $\omega = .89$).

Life Satisfaction. The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985; Pavot, & Diener, 2008) was used to assess the degree to which participants felt their satisfied with the course and current state of their lives. This five item Likert type measure has been widely used as an indicator of well-being, has been shown to have good internal reliability ($\alpha = .87$), and is exemplified by the following: “*In most ways my life is close to my ideal;*” and “*so far I have gotten the important things I want in life.*” The SWLS was implemented using a 6-point scale in the present study (1 = strongly disagree, 6 = strongly agree). The mean of all 5 items was then generated for each participant such that higher scores indicated greater levels of participant life satisfaction (present study, $\alpha = .90$, $\omega = .90$).

Free Will Belief

Volition Theme of FWB. Four items from the free will subscale of the Free Will and Determinism Scale (FAD-Plus; Paulhus & Carey, 2011) were used to measure participant levels of FWB. Participants rated their level of agreement to each item on a 6-point scale (1 = strongly disagree, 6 = strongly agree), and is exemplified by the following items: “*people have complete control over the decisions they make;*” and “*strength of mind can always overcome the body's*

desires.” The measure was mean scored for each participant, with higher scores indicating greater participant belief in free will. This measure has been documented as having an acceptable level of internal reliability ($\alpha = .75$, $\omega = .75$; present study).

Initial Item Pool for PAP Them of FWB. A collection of 27 items aimed at capturing the PAP notion of FWB were created. See Table 1.1 on page 102 for a complete list. Items were constructed to tap into PAP motifs identified in the literature. Examples include multiple paths into the future, counterfactuals of freedom, the will-do-an-action vs. must-do-an-action distinction, refraining from action, and responsibility. The multiple future paths motif is exemplified by the items “*People can choose to make a real difference because the future is not set in stone,*” and “*There are different futures that people can bring about through free choice.*” The counterfactuals of freedom motif can be exemplified by items such as, “*People could have made different decisions than the ones they actually made,*” and “*People could have chosen a different path that would have led to a different present.*” The will-do-an-action vs. must-do-an-action distinction is exemplified by, “*Just because someone will do a certain thing does not mean that they must do it,*” and “*Just because a person did a certain action does not mean that they had to do it.*” The refraining from action motif is exemplified by, “*People can choose to say no to their own wants and desires,*” and “*People could always decide to refrain from a given action.*” Lastly, the motif of responsibility is exemplified by the items, “*The ability to have done otherwise is needed for responsibility,*” and “*A person can only be held accountable for an action if they were able to do otherwise.*”

Face and Content Validity of PAP Item Pool. Two philosophers with expertise on the topic of free will looked over the item pool to provide feedback regarding face validity and content validity. Four items were identified as either problems or potential problems for face

validity and content validity. Notably, both experts independently identified the same 4 problem items. All 4 of these items were those aimed at the PAP motif of responsibility. The experts indicated the following two items as problems: 1) Item 26 (i.e., “*Human responsibility requires free choice*”) was too vague; 2) Item 27 (i.e., “*Every person can do good or bad—it's simply up to them*”) more accurately tapped the *sourcehood* notion of FWB than PAP. The experts also indicated that regardless of the previously stated problem (i.e., face invalid), all four items gave them pause simply because of the responsibility theme itself. This theme was viewed as having too much potential for, as one expert put it, “luring folks into agreeing with the ability-to-do-otherwise due to some desire to hold others accountable.” The other expert harkened the same, “What do you want to measure? People’s views of PAP or their views of responsibility and accountability?” the remaining two problem items were items 24 and 25 (i.e., “*The ability to have done otherwise is needed for responsibility,*” and “*A person can only be held accountable for an action if they were able to do otherwise;*” respectively). As the goal was to produce an accurate (as opposed to diverse) measure of PAP FWB, the responsibility motif items were dropped which resulted in an Item pool of 23.

Locus of Control

A brief measure of Locus of Control (Lumpkin, 1988) was used to assess participants perceived personal control over their lives. This was done to control for the known effects of personal control on subjective well-being when assess the FWB-subjective well-being relationship. This three item Likert scale has been shown to have good internal reliability ($\alpha = .87$) and is exemplified by the following: “when I make plans, I am almost certain to make them work;” and “when I get what I want, it is usually because I worked hard for it.” This brief internal locus of control measure was implemented using a 6-point scale (1 = strongly disagree, 6

= strongly agree). The mean of all 3 items was generated for each participant, with higher scores indicating greater participant levels of perceived personal control (present study, $\alpha = .86$, $\omega = .86$).

Attention Checks

Inattentive responding is a threat to surveys, especially online surveys. A participant is an inattentive responder when they answer survey questions with a disregard for the particular content of the items (Berry et al., 2016; Huang et al., 2015). Inattentive responders can take a random approach to responding (i.e., random selection of response options) or a non-random approach to responding (i.e., systematic selection of the same response option). This can produce response patterns that may look like acquiescence, extreme responding, or fence sitting (Berry et al., 2016; Huang et al., 2015), but are in fact mere inattentiveness. Two different items aimed at assessing participant inattentiveness were used. These items were: “*Please choose ‘strongly disagree’ for this item*” and “*Please choose ‘strongly agree’ for this item*” (see Marjanovic, Struthers, Cribbie, & Greenglass, 2014). Both items were used twice throughout the survey and at random. Responses other than “strongly disagree” (i.e., for the question “*Please choose ‘strongly disagree’ for this item*”) and “strongly agree” (i.e., for the question “*Please choose ‘strongly agree’ for this item*”) were classified as random responses and assumed to indicate participant inattentiveness. The present research used a conservative standard, participants needed to pass all four of these questions to be included in analyses.

Data Analyses

The data was screened for inattentive respondents and 263 (21%) were classified as inattentive and therefore excluded from analyses. While this is a relatively higher proportion of inattentiveness it is still within the expected range (Maniaci & Rogge, 2014). The final sample

($N = 995$), for which the following analyses are based, remained demographically equivalent to the initial sample. Participants were 18 to 55 years of age ($M = 19.79$, $SD = 2.94$), largely made up of White women (69%) and mostly White/Caucasian (44%, 23% Black/African American, 14% Asian, 11% Latinx, 8% other).

Factor Analytic Approach for PAP Item Pool

While the 23 pro-trait items were created to capture people's PAP FWB, there was no reasonably plausible factor structure hypothesized a priori. As a result of the absence of any plausible a priori factor structure, the chosen factor analytic approach was exploratory factor analysis (hereafter, EFA). However, the process of conducting an EFA enjoys little consensus and is replete with dilemmic opportunities that often pit theory and pragmatics against the observed. This fact is encountered quickly. As Lee and Ashton soberly stated, "The question of how many factors to extract involves a tradeoff between parsimony and completeness" (2007; p. 431). Due to the plethora of strategies that one can take when conducting an EFA (Lee & Ashton, 2007; Meyers et al., 2017), a relatively algorithmic decision process was established prior to EFA to serve as a guide for factor analyzing the data.

This EFA decision process was the result of a thorough reading of the literature on factor analytic methodology and was intended to enable more systematic decisions to questions such as: How many factors should be extracted and with what extraction method? If a multi-factor model is produced, how should the factors be rotated to achieve simple structure? How to choose between competing models when several claim to achieve simple structure? What is a satisfactory loading? Should all items with satisfactory loadings be kept? How to go about item reduction?

Determining the Number of Factors to Extract

Kaiser Rule and Parallel Analysis. The Kaiser rule directs the number of factors to be extracted from the data to be equal to the number of eigenvalues in the data greater than 1 (Kaiser, 1960; Cliff, 1988). However, while this is the most common method of determining the number of factors to extract (Meyers et al., 2017), it has been widely criticized for its tendency to over-extract factors (Lee & Ashton, 2007; Meyers et al., 2017). Parallel analysis (Glorfeld, 1995; Horn, 1965; Zwick & Velicer, 1986) was introduced as a solution to the over-extraction problem of the Kaiser rule. Parallel analysis is a Monte Carlo data simulation technique that randomly produces eigenvalues based around the parameters of a given dataset. The number of eigenvalues in the actual data that are greater than their corresponding eigenvalues from the simulated dataset is taken to indicate the number of factors that should be extracted (Lee & Ashton, 2007). When the eigenvalues of the simulated dataset become greater than (i.e., crossover) the corresponding eigenvalues of the actual dataset, said crossover point is taken as the cutoff point for the number of factors to be extracted (Lee & Ashton, 2007).

The Goldberg Method. The EFA decision process established for this work was informed by the Kaiser rule and parallel analysis, as well as the factor analytic approach advocated by Goldberg (2006). For this approach, many EFAs of varying factor structures are assessed and compared. The final solution is then chosen by singling out the factor structure that is the most parsimonious while also enjoying as much theoretical utility as possible (Goldberg, 2006). While this method is one that many support (Lee & Ashton, 2007; Meyers et al., 2017), especially in the case of scale development, the starting point is undefined. Does one start with the Kaiser rule or something else? Moreover, does one move up or down in the number of factors for the multiple EFA comparisons? In the face of such ambiguity this method has been criticized for its potential to introduce bias into the process of determining optimal factor solutions (Revelle &

Wilt, 2013; Sellbom, & Tellegen, 2019). Nevertheless, the strength of this method is not lost here. That is, to determine the optimal factor solution whilst in the presence of theory (Lee & Ashton, 2007).

The Present EFA Decision Process. The EFA decision process for this work was multifaceted. It was anticipated that several EFAs may need to be conducted to find the optimal factor solution. Motivated by that possibility, the EFA decision process used here first set out to establish a means to restrict the potential number of EFAs to result in a more conservative Goldberg inspired approach. This was achieved by reframing the Kaiser rule as an upper limit on the total number of factors and parallel analysis as the lower limit. Hence, a three-step process was formulated. First, the Kaiser rule would be assessed and used to set the upper limit of the total number of possible solutions. Second, parallel analysis would be conducted and assessed to set the lower limit for the number of solutions to be assessed. Lastly, the range of solutions provided by both approaches would also be factor analyzed. For this multifaceted EFA factor extraction decision process, it should also be noted that in the event of the Kaiser rule directing a single factor solution, parallel analysis is rendered moot. As the purpose of parallel analysis is to reduce the number of factors to be extracted compared to the Keiser rule. By restraining the Goldberg method with these upper and lower limits, the resulting EFA decision process provided a greater degree of a priori systematization and so serves to reduce researcher degrees of freedom (i.e., with respect to choosing a solution from a set of competing solutions) while also preserving the primacy of theory and its utility.

Factor Extraction, Loadings, and Markers of Simple Structure

While primary axis factoring is currently the most recommended estimation method for factor extraction, this is only true in isolation as it is also recommended that multi-study factor

analytic projects use one estimated method across all studies (Lee & Ashton, 2007; Meyers et al., 2017; Sellbom, & Tellegen, 2019). This led the present work to the maximum likelihood estimation method of factor extraction. Study 2 seeks to replicate the factor structure achieved here in Study 1, but with the more constrained modeling procedure of confirmatory factor analysis (CFA), requiring maximum likelihood estimation.

Multi-factor solutions need to go through a data rotation process to obtain simple structure. Simple structure is the data's optimal balance between all items loading highly (i.e., approaching 1) on their respective primary factors and lowly (i.e., approaching 0) on all others whilst under the requirement that all items load on all factors (Lee & Ashton, 2007; Meyers et al., 2017; Sellbom, & Tellegen, 2019). Any rotations to be performed here were planned to be oblique promax rotations. The promax rotation method conducts the rotation process in several stages. First the solution is rotated with an orthogonal (non-correlated) varimax rotation. This allows the solution to first maximize the amount of variance that is unique to each factor (Lee & Ashton, 2007; Meyers et al., 2017; Tabachnick & Fidell, 2017). Then further rotations are carried out in an oblique manner, slowly allowing the factors to correlate and reach simple structure (Lee & Ashton, 2007; Meyers et al., 2017; Tabachnick & Fidell, 2017). This is the most conservative (i.e., mathematically constrained; procrustean) rotation solution available to EFA and the reason for its inclusion.

Consistent with the EFA literature, several values were set a priori to serve as thresholds and guide the process of determining simple structure among a potential handful of competing factor solutions. A weakness of EFA is that factor solutions can be overly influenced by the idiosyncrasies of the sample for which they are based (Lee & Ashton, 2007; Meyers et al., 2017; Tabachnick & Fidell, 2017; Sellbom, & Tellegen, 2019). To offset this, conservative thresholds

were used for factor loadings and communalities and an item's factor loading was deemed satisfactory if was ≥ 0.55 and its communality was ≥ 0.4 . Also, individual factors within multi-factor structures should be well correlated with each other (Tabachnick & Fidell, 2017).

However, one of the primary signs that a given factor solution is over extracted is seen when two or more factors within a multi-factor structure correlate too highly (Tabachnick & Fidell, 2017).

Hence, the threshold for inter-factor correlations was < 0.7 . Any inter-factor correlations exceeding 0.7 were then to be taken as evidence of over extraction.

Structural Equation Modeling Approach

Hypotheses 2-6 were assessed through a two-stage structural equation modeling (hereafter, SEM) procedure. In the first phase, a measurement model will be constructed to assess the adequacy of the latent FWB and subjective well-being constructs (Meyers et al., 2017; Tabachnick & Fidell, 2017). The measurement model phase is essentially equivalent to confirmatory factor analysis (Meyers et al., 2017; Tabachnick & Fidell, 2017). The goal here is to simultaneously confirm that the observed FWB measures (i.e., FAD-Plus and the new PAP measure) and subjective well-being measures (i.e., SWLS, GAD-7, PHQ-9) satisfactorily load onto their corresponding hypothesized latent variables and that the resulting structure satisfactorily fits the data.

Markers Informing Satisfactory Fit

By consult of the SEM method literature, several thresholds guided the process of determining the adequacy of the SEM models. Consistent with recommendations, an observed indicator's factor loading was deemed satisfactory at ≥ 0.3 ($\geq .3$ indicating modest strength, $\geq .6$ indicating substantial strength; Meyers et al., 2013). The measurement model was initially assessed without the use of correlated errors. However, due to the well-known covariability of

depression and anxiety symptomology (Aina & Susman, 2006; APA, 2013; Choi, Kim, & Jeon, 2020; Groen, 2020), it was predicted that the errors for these subjective well-being indicators would need to be correlated to achieve satisfactory fit. No other modification indexes were entertained.

Model fit is of substantial importance to SEM. At base, model fit determines the degree to which the covariance matrix of a sample is equivalent to that of the estimated population (Ullman, 2013). Model fit can be assessed through many different indices. Consistent with recommendations, fit was assessed in a collective manor and interpreted on the basis of the overall pattern suggested by the following indices: the normed fit index (NFI; Bentler & Bonett, 1980), the incremental fit index (IFI; Bollen, 1989b), the comparative fit index (CFI; Bentler, 1988), the root mean square error of approximation (RMSEA; Browne & Cudeck, 1993), the root mean square residual (RMR; Hu & Bentler, 1999), the goodness-of-fit index (GFI; Bentler, 1983), the adjusted fit index (AGFI; Tanaka & Huba, 1989), and the Akaike Information Criterion (AIC; Akaike, 1987; Bozdogan, 1987).

The NFI, IFI, CFI, and RMSEA belong to a subclass of fit indices referred to as comparative fit indices. The approach to fit for these widely used indices is to establish where the estimated model exists along a continuum ranging from total independence (i.e., completely unrelated variables) to fully saturated (i.e., all variables are allowed to correlate). For the NFI, IFI and CFI, values $\geq .9$ and $\geq .95$ indicate adequate fit and good fit, respectively (Bentler, 1988; Bentler & Bonett, 1980; Bollen, 1989b). For RMSEA, values $\leq .8$ and $\leq .5$ indicate adequate fit and good fit, respectively (Browne & Cudeck, 1993).

The RMR belongs to the subclass of fit indices referred to as the residual-based fit indices. The residual-based approach to fit compares the average differences between the sample

variance (and covariance) and the estimated population variance (and covariance). For RMR, values $\leq .08$ and $\leq .05$ indicate adequate fit and good fit, respectively (Hu & Bentler, 1999).

The GFI and AGFI belong to the subclass of fit indices referred to as the indices of proportion of variance accounted for. Here, model fit corresponds to the amount of variability in the sample covariance that can be explained by the estimated population covariance (Kenny, 2011). For the GFI and AGFI, values $\geq .9$ and $\geq .95$ indicate adequate fit and good fit, respectively (Bentler, 1983; Tanaka & Huba, 1989).

The AIC belongs to the degree of parsimony subclass of fit indices. Several of the indices above can overestimate the fitness (i.e., indicate greater fit) of a model as the number of parameters estimated increases. Degree of parsimony fit indices are intended to reduce overestimation of fitness by either penalizing complexity, rewarding parsimony, or both. The AIC is intended for model comparisons and so at least two competing models are needed for AIC to be interpretable. Smaller values indicate better fit (Akaike, 1987; Bozdogan, 1987).

Historically, model fit was assessed with a χ^2 test statistic. While the χ^2 remains a commonly reported fit index, it is extremely sensitive and most often produces values indicating poor fit for samples larger than 500. Therefore, many experts suggest the χ^2 to be of little interpretive value when fitting models to relatively larger datasets (Kenny, 2011; Meyers et al., 2017; Tabachnick & Fidell, 2017). Consequently, while the χ^2 will be reported, it will not be treated as a fit index of interpretive value due to the relatively large sample size of the present dataset.

Results

Exploratory Factor Analysis of PAP Items

The first two eigenvalues of the data were 8.78 and 0.73. The Kaiser rule indicates a single factor solution would best suit the data. Hence, parallel analysis was unnecessary. The factor loadings from the one-factor solution's factor matrix are presented in Table 1.2 on page 103. Ten items—1, 3, 8, 9, 10, 12, 15, 17, 20, 23—loaded onto a unitary PAP construct. These ten items refer to primary PAP motifs, such as counterfactuals of freedom (i.e., items 1 and 3), possible futures (i.e., items 8, 9, 10, and 12), action refrains (i.e., items 15, 17, and 20), and the will-do vs. must-do distinction (i.e., item 23). It is important to note nearly all of the PAP motifs that guided item construction (other than responsibility) were represented by at least one of the ten items in this single-factor solution.

A second EFA was conducted on the preliminary 10-item PAP scale (hereafter, PAPS-10) to assess the structure of the ten retained items absent the thirteen that were dropped. The first two eigenvalues were 4.45 and 0.27. All ten items again loaded onto a single PAP factor, with satisfactory loadings ranging from ($\lambda = .615-.702$); see Table 1.3, page 105. The ten-item single PAP factor accounted for 50.1% of the variability amongst the items. The item correlations ($r = .33-.57$; determinant = .02) and item-all correlations were satisfactory ($r = .57-.67$). Lastly, estimates of internal reliability indicated a high level of interitem coherence ($\alpha = .888$, $\omega = .889$).

The average PAPS-10 scores for each participant were calculated to assess indicators of construct validity, as well as any potential demographic differences in PAP FWB. As a measure of FWB, participant's PAPS-10 scores should be positively associated with their FAD-Plus FWB scores at an effect size that is on the weaker end of strong (i.e., $r \approx .55-.69$). Such a result would be preliminary evidence of convergent validity. As the PAPS-10 is intended to be a measure of FWB and not perceived personal control, participant's PAPS-10 scores should be positively

associated with their LOCI scores; ideally at an effect size no stronger than moderate (i.e., $r = .3-.45$). Such a result would be preliminary evidence of divergent validity. The data supported these expectations; see Table 1.4, page 106. Participant's PAPS-10 scores were strongly—though not too strongly—and positively correlated with their FAD-Plus FWB scores ($r = .59$), as well as moderately and positively correlated to their LOCI scores ($r = .41$). The unitary factor that emerged from this data satisfied all the factor analytic requirements of the multi-faceted EFA approach established for this study. Moreover, the single factor of the PAPS-10 is coherent and substantially aligns with the theoretical conceptualization of PAP portrayed in the literature (i.e., possessing all relevant PAP motifs). The preliminary PAPS-10 is inferred to have approximated participant's true PAP FWB. That is, PAPS-10 is determined as having demonstrated a good degree of face and content validity, as well as a promising—though merely preliminary—degree of convergent and divergent validity.

The average PAPS-10 scores for each participant were calculated to assess demographic differences in PAP FWB. No gender differences [Men $M = 4.89$, Women $M = 4.83$, $t(978) = 1.35$, $p > .05$] or racial differences [White $M = 4.89$, Black $M = 4.83$, Latinx $M = 4.79$, American Indian or Alaska Native $M = 5.37$, Asian $M = 4.73$, Hawaiian or Pacific Islander $M = 5.22$, $F(6, 978) = 2.16$, $p > .05$] in participant's PAP FWB were observed.

Exploratory Factor Analysis of all FWB Items

A third EFA was conducted with all 10 PAP items and all items of the FAD-Plus to further determine the factor structure of these FWB items. Because EFA is a data-centric (as opposed to a theory-centric) approach, using an EFA with all FWB items together serves as a more rigorous assessment of the factor structure of the new PAP measure. This EFA revealed a three-factor model with all the 10 PAP items loading onto a single factor (factor 1) and the FAD-

Plus FWB items loading onto two factors (see table 1.4 on page 106 for all factor loadings). Four of the FAD-Plus items loaded onto factor 2, one FAD-Plus item loaded onto factor 3, and two FAD-Plus items failed to load on factors 1-3. These results provide strong evidence that 10 PAP items do indeed form a single PAP FWB factor that is distinct from the volition FWB factor of the FAD-Plus.

SEM of FWB on SWB

Descriptive statistics were conducted for all measures and satisfactory levels of normality, linearity, and homoscedasticity were found; see Table 1.5, page 107. Tests of hypotheses 2-5 were assessed through structural equation modeling with maximum likelihood estimation. The structural equation model (SEM) was developed using AMOS 25.0 (Arbuckle, 2014) to substantiate the hypothesized pattern of relations among the latent variables leading from FWB and LOC to SWB. For this analysis, it was first hypothesized that the satisfaction with life, anxiety, and depression measures would load onto one superordinate SWB construct. Second, it was hypothesized that both the volition (i.e., FAD-Plus) and PAP themes of FWB would load onto one superordinate FWB construct. It was then hypothesized that FWB and LOC would directly and positively relate to subjective well-being. Finally, it was hypothesized that locus of control would mediate the relationship between FWB and SWB.

Contrary to prediction, the first measurement model—wherein the error terms for anxiety and depression were not allowed to correlate—fit the data better than expected. Most of the fit indices for this measurement model met the thresholds required for adequate-good model fit. However, RMSEA indicated that the model poorly fit the data; see Figure 1.4, page 94. The second measurement model was still conducted, as it is desirable to account for the strong correlation between anxiety and depression.

As predicted, the second measurement model with correlated error terms for anxiety and depression fit the data better than measurement model 1. The model was satisfactorily multivariate normal (Mardia's coefficient = 8.23, CR = 13.26) and all fit indices indicated good model fit; see Figure 1.5, page 95. The second measurement model also supported hypotheses 2 and 3 of this study. Specifically, the hypothesized superordinate latent constructs for both subjective well-being and FWB were supported by the data. All factor loadings ranged from medium to strong (.40-.97), with most being strong. Lastly, subjective well-being, FWB, and locus of control were all positively associated. Due to the well-fitting nature of the second measurement model, the SEM advanced to the structural model phase.

From a model fit perspective, the structural model was statistically equivalent to measurement model 2. That was due to the fact that the only real change to the model was from bidirectional arrows to unidirectional arrows for the FWB, locus of control, and subjective well-being variables. Nevertheless, the capstone hypothesis of this study required mediation, necessitating the move from measurement model (i.e., with bidirectional arrows) to structural model (i.e., unidirectional arrows).

As predicted, the structural model supported hypotheses 4-6 for this study; see Figure 1.6, page 96. Specifically, FWB and locus of control both directly and positively relate to subjective well-being; respectively ($b = .17, p = .03$; $b = .33, p < .001$). Also, there was a significant indirect effect for FWB on subjective well-being through locus of control ($b = .23, \beta = .14, p < .001$). Such that, greater FWB predicted more adaptive subjective well-being through FWB's positive relationship with locus of control. Importantly, the significant direct effect for FWB on subjective well-being was evidenced in the presence of the mediator, locus of control. Lastly, the total effect for FWB on subjective well-being was also significant ($b = .40, \beta = .25, p < .001$).

Discussion of Study 1

One of the two objectives of this study was to develop a new PAP measure of FWB, as well as empirically assess the relationship between FWB and SWB. A unitary, 10-item PAP factor emerged from the factor analytic procedure. The new PAPS-10 measure shows preliminary evidence of indeed being PAP-themed measure of FWB, as well as being distinct from the commonly used volition themed measure of FWB (i.e., FAD-Plus). Furthermore, this study provides preliminary evidence of the pragmatic utility of the PAPS-10 by way of the relative success of the SEM approach used here. Specifically, the PAPS-10 and the FAD-Plus loaded onto a superordinate FWB construct which was then successfully modeled to predict subjective well-being. By combining the two core FWB themes of volition and PAP into a superordinate FWB construct—as was done here, FWB researchers may be better equipped to test hypotheses and model FWB theories. Of course, that is the goal, not the current reality. The PAPS-10 needs to be replicated and subjected to further scrutiny. Study 2 of this multi-study project seeks to continue that work by replication.

The other primary focus of this study was to empirically assess the relationship between FWB and subjective well-being. Three hypotheses were formulated to do so. I hypothesized that greater FWB would predict more adaptive subjective well-being (i.e., greater satisfaction with life and less depression and anxiety), that locus of control would do the same, and that the FWB-subjective well-being relationship would be mediated by locus of control. All three of these hypotheses were supported by the data. Moreover, a direct effect for FWB on subjective well-being was observed. The SEM structure observed here supports the general adaptiveness of FWB suggested by the cultural-animal model.

While all hypotheses for this study were supported, the SEM structure observed for this data should be replicated in another sample. The single factor structure of the new PAP FWB measure should also be reassessed and replicated in another sample as EFA can be vulnerable to extant sample idiosyncrasies. Replication of the findings presented here (both EFA and SEM) will provide further evidence in support of the FWB to subjective well-being theoretical model, as well as increase the indicated validity of the single factor PAP FWB measure. Such is the goal and scope of Study 2.

Study 2: Overview

The goal of Study 2 was to replicate the findings of Study 1. I hypothesized that the single factor PAP FWB measure that emerged from the data of the prior study would emerge of the data here. I also hypothesized that the FWB to subjective well-being SEM evidenced in the prior study would be observed by the data here. Nearly the same hypotheses from Study 1 (i.e., hypotheses 2-6) were carried over to this study. Due to the observed single factor structure of PAPS-10, hypothesis 1 was updated to reflect that fact. The same methodological and analytic approaches from Study 1 were repeated here with fidelity. An online cross-sectional survey method was implemented to assess the following six hypotheses:

H₁: The unitary PAP FWB factor structure of PAPS-10 will be confirmed.

H₂: The depression, anxiety, and life satisfaction measures will load onto one superordinate latent construct of well-being.

H₃: The new PAP FWB factor (i.e., PAPS-10) and the commonly used volitional FWB factor (i.e., FAD-Plus FW subscale) will load onto one superordinate latent construct of FWB.

H4: The latent FWB variable will have a direct and positive relationship with the latent well-being variable.

H5: Internal locus of control will have a direct and positive relationship with the latent FWB and subjective well-being variables.

H6: the FWB and SWB relationship will remain significant after accounting for the predicted relationships for locus of control.

Study 2: Method

Participants

Survey respondents were undergraduate college students from the greater Richmond, Virginia (VA) area. A total of 919 people, ranging from 18 to 49 years of age ($M = 19.05$, $SD = 2.18$) completed the survey. The sample was mostly women (68%) and mostly White/Caucasian but, consistent with Study 1, fairly diverse (42%, 21.5% Black/African American, 17% Asian, 9.5% Latinx, 9% other, 1% Native Hawaiian or Pacific Islander). Each person that participated in the study received credits towards research participation requirements, the result of class or departmental policy.

Materials and Procedure

The survey was implemented identically to that of Study 1. The online survey recruited people through SONA Systems. After they consented to the study, the participants were redirected to a Qualtrics portal to complete the survey. The same measures aimed at assessing people's subjective well-being (i.e., depression, anxiety, and satisfaction with life), FWB, LOC, and demographic characteristics from Study 1 were used in Study 2 with fidelity.

Measures

Subjective Well-Being

The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985; Pavot, & Diener, 2008), was again used as a positive indicator of subjective well-being. The response format was a 6-point Likert (1 = Strongly disagree, 6 = Strongly agree). As before, the Generalized Anxiety Disorder scale (GAD-7) and Patient Depression Questionnaire (PHQ-9) were used to assess participant's normative (i.e., non-clinical) levels of anxious and depressive symptomatology (Spitzer, Kroenke, Williams & Lowe, 2001; Spitzer, Kroenke, Williams & Lowe, 2006), and served as negative indicators of subjective well-being. Participants rated how often (over the last two weeks) they felt bothered by anxious and depressive symptomatology. The response format was again a 4-point scale (1 = Not at all, 4 = Nearly every day). Assessments of internal reliability for this data indicated that these three measures possessed a strong degree of interitem coherence (SWLS, $\alpha = .89$, $\omega = .89$; GAD-7, $\alpha = .90$, $\omega = .90$; PHQ-9, $\alpha = .86$, $\omega = .86$).

Free Will Beliefs

The four items from the FAD-Plus (Paulhus & Carey, 2011) were again used as an assessment of participant's volition themed FWB, while the new PAPS-10 was used as an assessment of participant's PAP themed FWB. The response format for both FWB measures was again a 6-point Likert (1 = Strongly disagree, 6 = Strongly agree). Assessments of internal reliability for this data indicated that these measures possessed an adequate to strong degree of interitem coherence (FAD-Plus FW subscale, $\alpha = .75$, $\omega = .75$; PAPS-10, $\alpha = .91$, $\omega = .91$).

Locus of Control

The brief measure of internal LOC (Lumpkin, 1988) used in the previous study was used again here to assess participant's perceived personal control over their lives. The response format was a 6-point Likert (1 = Strongly disagree, 6 = Strongly agree) as it was previously. An

assessment of internal reliability for this data indicated that this measure possessed an adequate degree of interitem coherence ($\alpha = .84$, $\omega = .84$).

Attention Checks

To help ensure the online survey would produce trustworthy data, the two attention check items from the previous study were used again here, in Study 2. Participants were directly asked to “*Please choose ‘Strongly disagree’ for this item*” and to “*Please choose ‘Strongly agree’ for this item*” (see Marjanovic et al., 2014). The response format for these two attention check items was a 6-point Likert (1 = Strongly disagree, 6 = Strongly agree). As was done in the first study, both items were each assessed twice at random. Also, as was the case for the first study, a conservative standard was set for these items. Participants needed to provide the correct answers to all four of these items to be included data analyses.

Data Analyses

After screening the data for inattentive respondents, 159 (17%) were classified as inattentive and excluded from analyses. The final sample ($N = 760$), for which the following analyses are based, remained demographically equivalent to the initial sample. Participants were 18 to 49 years of age ($M = 19.79$, $SD = 2.94$), mostly women (69%) and mostly White/Caucasian (42%, 21.5% Black/African American, 17% Asian, 9.5% Latinx, 9% other, 1% Native Hawaiian or Pacific Islander). Descriptive statistics and bivariate correlations were conducted for all measures (see Table 2.1, page 108). The assumptions of univariate normality, linearity, and heteroscedasticity were satisfied. Hypothesis 1 was assessed with an EFA. Tests of hypotheses 2-5 were assessed through structural equation modeling with maximum likelihood estimation.

Factor Analytic Approach for PAPS-10

The decision regarding the number of factors to extract no longer contains as much potential for researcher bias to occlude factor analytic judgement because the preliminary PAPS-10 measure directs the extraction of a single PAP factor. The EFA strategy for this study first sought to replicate the PAPS-10 EFA results observed in Study 1. The more conservative numerical thresholds abided to in Study 1 were not used here, as the present EFA enjoys greater theoretical grounding. The more customary thresholds for satisfactory factor loadings (i.e., 0.5) and communalities (i.e., 0.3) were used. The multi-faceted EFA approach constructed for and described in Study 1 still served as a guide in Study 2. In the event the PAPS-10 failed to replicate, said multi-faceted EFA approach was to be followed.

Structural Equation Modeling Approach

In line with replicating Study 1, hypotheses 2-6 were assessed through a two-stage SEM procedure consisting of a measurement model (first phase) and a structural model (second phase). Wherein the measurement model assesses the adequacy of the latent FWB and subjective well-being constructs, and the structural model assesses the hypothesized theoretical model predicting subjective well-being from FWB as mediated by LOCI. For the SEM, factor loadings were deemed satisfactory at ≥ 0.3 ($\geq .3$ indicating modest strength, $\geq .6$ indicating substantial strength; Mayers et al., 2013). As was the case for Study 1, the measurement model was initially assessed without the use of correlated errors for anxiety and depression. It was again predicted that by allowing anxiety and depression to correlate in the SEM that better and more realistic model fit would result.

The indices of model fit used for the previous study were again used in the same way here. For the NFI, IFI and CFI, values $\geq .9$ and $\geq .95$ indicate adequate fit and good fit, respectively (Bentler, 1988; Bentler & Bonett, 1980; Bollen, 1989). For RMSEA, values $\leq .8$ and

$\leq .5$ indicate adequate fit and good fit, respectively (Browne & Cudeck, 1993). For RMR, values $\leq .08$ and $\leq .05$ indicate adequate fit and good fit, respectively (Hu & Bentler, 1999). For the GFI and AGFI, values $\geq .9$ and $\geq .95$ indicate adequate fit and good fit, respectively (Bentler, 1983; Tanaka & Huba, 1989). The AIC is intended for model comparisons, smaller values indicate better fit (Akaike, 1987; Bozdogan, 1987). Also, while the χ^2 model fit will be reported, it will not be treated as a fit index of interpretive value due to the relatively large sample size of the present dataset and the likelihood of the χ^2 value to indicate poor fit regardless.

Results

PAPS-10 Exploratory Factor Analysis

The EFA results for the PAPS-10 fully replicated the single factor solution that emerged from Study 1. Consistent with both the spirit of replication and the Kaiser rule, the first two eigenvalues of the data were 3.95 and 0.31. Indicating that a single factor solution for the PAPS-10 would best suit the data. All ten items loaded onto the single PAP factor with satisfactory loadings ($\lambda = .57-.68$); see Table 2.2, page 109. The PAPS-10 accounted for 45.53% of the variability amongst the items. The item correlations ($r = .25-.52$; determinant = .037) and item-all correlations for the PAPS-10 were satisfactory ($r = .52-.63$) and estimates of internal reliability were again found to indicate a high level of interitem coherence ($\alpha = .866$, $\omega = .867$).

Average scores for the 10-item PAP scale were calculated for each participant to assess demographic differences in PAP FWB. Consistent with the previous study, no gender differences [Men $M = 4.89$, Women $M = 4.85$, $t(747) = 0.74$, $p > .05$] nor racial differences [White $M = 4.85$, Black $M = 4.96$, Latinx $M = 4.79$, American Indian or Alaska Native $M = 4.10$, Asian $M = 4.83$, Hawaiian or Pacific Islander $M = 4.63$, $F(6, 752) = 1.20$, $p > .05$.] in participant's PAP FWB were observed.

Exploratory Factor Analysis of all FWB Items

A was done in the prior study, another EFA was conducted with all 10 PAP items and all items of the FAD-Plus to get a more rigorous assessment of the factor structure of the new PAP measure. As was the case in the prior study, this EFA revealed a three-factor model with all 10 PAP items loading onto a single factor (factor 1) and the FAD-Plus FWB items loading onto two factors (see table 2.3 on page 110 for all factor loadings). Four of the FAD-Plus items loaded onto factor 2, two FAD-Plus items loaded onto factor 3, and one FAD-Plus item failed to load on factors 1, 2, or 3. These results replicate the prior study's findings and provide strong evidence that the 10 PAP items form a single PAP FWB factor that is distinct from the volition FWB factor of the FAD-Plus.

Structural Equation Model for Free Will Belief on Well-Being

A structural equation model (SEM) was constructed with AMOS 25.0 (Arbuckle, 2014) to test the hypothesized structure predicting subjective well-being from FWB through LOCI. In line with the previous study, it was hypothesized that the superordinate latent variable of subjective well-being would be substantiated by the indicators of satisfaction with life, anxiety, and depression (i.e., SWLS, GAD-7, PHQ-9; respectively). It was also hypothesized that the superordinate latent FWB variable would be substantiated by the indicators of the volition FWB theme and the PAP FWB theme (i.e., FAD-Plus FW, PAPS-10; respectively). Next, it was hypothesized that FWB and LOCI would directly and positively relate to subjective well-being. Lastly, it was hypothesized that LOCI would mediate the relationship between FWB and subjective well-being.

The Measurement Model

As was also true of Study 1, the first measurement model for this data portrayed poorer fit indices than the second measurement model, wherein the errors for the anxiety and depression indicators were modeled to correlated. See Figure 2.1 on page 97 for more details of the initial measurement model. The second measurement model was multivariate normal (Mardia's coefficient = 12.75, CR = 17.97) and fit the data satisfactorily; see Figure 2.2, page 98. Consistent with the findings from Study 1, the superordinate latent variables for subjective well-being and FWB emerged from the data with satisfactory loadings (ranging from .48-.80). This data successfully replicated the first study's findings for hypotheses 2 and 3 and the SEM procedure advanced to the structural model phase.

The Structural Model

The structural model constructed to replicate the findings for hypotheses 4-6 was again statistically equivalent (i.e., same model fit indices) to the second measurement model for this study due to the numerical equivalence of bidirectional and unidirectional arrows. As predicted, results of the structural model replicated the first study's findings for hypotheses 4-6; see Figure 3, page 99. Specifically, FWB and LOCI both directly and positively predicted subjective well-being ($b = .18, p = .039$; $b = .69, p < .001$; respectively). The indirect effect for FWB on subjective well-being through LOCI was significant ($b = .17, \beta = .13, p < .001$). Such that, greater FWB predicted more adaptive subjective well-being through the positive relationship between FWB and LOCI. The significant total effect for FWB on subjective well-being observed in Study 1 was also replicated ($b = .34, \beta = .27, p < .001$).

Discussion of Study 2

This study set out to replicate the findings of Study 1. To that end it was a success. The same single factor structure for PAP FWB that emerged from the EFA in Study 1 also emerged

from the EFA performed on this data. This provides further evidence to suggest that the PAPS-10 is indeed capturing a unitary PAP themed FWB. This study also evidences the PAPS-10 as distinct from the free will subscale of the FAD-Plus, the volition-themed FWB measure. Furthermore, due to the successful replication of the FWB to subjective well-being SEM, this study also further exemplifies the PAPS-10's pragmatic utility by way of the relative success of the SEM approach used here. As found in the first study, the PAPS-10 and the FAD-Plus loaded onto one superordinate FWB construct which then predicted subjective well-being. Specifically, people with greater FWB were also found to have more adaptive subjective well-being scores (i.e., greater satisfaction with life and less depression and anxiety). As was true of the first study, the FWB to subjective well-being relationship was both direct and indirect. Greater FWB predicted more adaptive subjective well-being through greater perceived personal control.

Discussion of Studies 1 and 2

Gooding and colleagues claimed, "the predictive utility of FWB on personal life outcomes is abolished when controlling for personal choice" (2018, p. 5). In contrast to Gooding et al., the presently reported research found a direct effect for FWB to SWB while accounting for LOC as a mediating variable; Providing evidence in favor of Zhao and Huo (2022) and others (Collier & Shi, 2020; Kondratowicz-Nowak & Zawadzka, 2018; Li et al., 2017; Li & Wong; 2020; Moynihan, Igou, van Tilburg; 2017) by again supporting the positive connection between FWB and SWB.

Studies 1 and 2 presented evidence supporting the PAPS-10 as a validity and internally reliable measure of the PAP FWB construct. The two previous studies also presented correlational evidence in support of the FWB to subjective well-being model that is predicted by the adaptive purpose imbuing function of FWB as detailed in my literature review. However,

while the results of the previous studies are promising, more rigorous assessments of the PAPS-10 's construct validity and reliability (specifically, test-retest reliability) were needed to more firmly establish the PAPS-10 as a valid and reliable measure of the PAP FWB construct. The methodology of Study was designed to satisfy such needs. Also, while the SEMs employed in the previous studies supported the overall adaptive function of FWB for subjective well-being hypothesis, the methodologies that were employed were merely correlational. Therefore, the casual path from FWB to subjective well-being predicted by the both the cultural-animal model of FWB and implied by the observed SEM structures of studies 1 and 2 warranted experimental testing. Furthermore, the previous studies only assessed the mere adaptive role of FWB, leaving any mechanistic theoretical claims (e.g., FWB as purpose-imbuing) unexamined. The methodology of Study 4 was then designed to assess the causal path of FWB to SWB predicted by the purpose-imbuing model of FWB.

Overview of Study 3

The findings from studies 1 and 2 provided preliminary evidence in support of the PAPS-10's construct validity as a measure of the free will belief (FWB) theme known as the principal of alternate possibilities (PAP), as well as its inter-item reliability. However, such evidence was not yet complete and could not satisfy the methodological and evidential demands required for confidently inferring adequate construct validity and reliability. The PAPS-10 needed more rigorous and holistic evidence in support of adequate levels divergent validity. Also, the PAPS-10 measure needed to pass a thorough assessment of reliability by evidencing an adequate amount of test-retest reliability; as worldview-level beliefs are, in theory, closer in kind to trait level phenomena with some state-like characteristics (Fleeson & Jayawickreme, 2015; Koltko-Rivera, 2004; Nilsson, 2014; Steyer, Ferring, & Schmitt, 1992; Steyer, Schmitt, & Eid, 1999).

The purpose of Study 3 was to provide such evidence and therefore reasonably infer the adequacy of the PAPS-10's construct validity and reliability.

The primary aims of Study 3 were fourfold. First, this study was conducted to confirm the factor structure of the PAPS-10 through using the more restrictive factor analytic procedure known as confirmatory factor analysis, as opposed to the less restrictive factor analytic procedure previously used (i.e., exploratory factor analysis) in Studies 1 & 2. Second, this study assessed the construct validity (i.e., discriminant validity) of the new PAPS-10 measure by assessing the measure's associations to a host of potentially related yet theoretically and conceptually distinct phenomena (e.g., self-control, time orientation, rumination etc.). Next, this study assessed the predictive/criterion validity of the PAPS-10 by using the construct's philosophically and psychologically accurate definition as the criterion. Lastly, this study assessed the temporal stability (i.e., test-retest reliability) of the PAPS-10 across a one-week interval.

Accordingly, I hypothesized:

- H₁:** The single factor structure of the PAPS-10 measure would be replicated by confirmatory factor analysis.
- H₂:** The correlation coefficients estimating the relationships between the PAPS-10 and all other included measures (e.g., LOC, self-control, mindset, rumination) would not exceed a medium effect size (i.e., $r \leq .45$); thereby indicating satisfactory divergent validity.
- H₃:** Participants PAPS-10 scores would strongly and positively predict the degree to which they agree with the definition of PAP as being an accurate description of free will; thereby indicating criterion validity.

H4: The correlation coefficient estimating the temporal stability between the Timepoint 1 PAPS-10 score and the Timepoint 2 PAPS-10 score would be positive, significant, and indicate satisfactory stability (i.e., $r \geq .5$); thereby indicating satisfactory test-retest reliability.

Several specific hypotheses regarding Hypothesis 2 can be stated. First, I hypothesized that the PAPS-10 FWB measure would be positively associated with the FAD-Plus FWB measure, but that this association would not exceed a medium effect size (i.e., $r \leq .45$), indicating consistency but non-redundancy (i.e., $r \leq .45$) between both FWB measures. I also hypothesized that the PAPS-10 FWB measure would be positively yet moderately associated (i.e., $r \leq .45$) with measures of personal control (i.e., locus of control, self-mastery, trait self-control) and growth (i.e., growth mindset), indicating evidence of divergent validity for the PAPS-10. I also hypothesize that the PAPS-10 FWB measure would be positively associated (i.e., $r \leq .45$) with measures of temporal orientation and ruminative tendencies, providing evidence of divergent validity for the PAPS-10. Lastly, I hypothesized that the new PAPS-10 FWB measure would be positively but weakly (i.e., $r \leq .25$) associated the personality trait of conscientiousness.

Method

Participants

The participants ($N = 215$) were a nationally representative sample of United States citizens (see Table 3.1 on page 111 for demographics) recruited from Prolific (<https://prolific.co/>). Formerly known as Prolific Academic, Prolific is a for-profit company aimed at providing researchers access to pool of a well-motivated and attentive participants. Functioning much like Amazon's Mechanical Turk, Prolific claims that data collected from their service is free from bots and provided by motivated and attentive participants who have been

vetted by the service (Brandimarte, Samat, & Acquisti, 2017). People needed to be at least 18 years of age to participate in this study and were required to complete the entire study (i.e., Timepoint 1 and Timepoint 2) to receive compensation for their time. All participants were paid \$8 for completing the survey.

Materials and Procedure

This study was a short-term, two-timepoint, longitudinal online survey. The survey was implemented through Qualtrics and disseminated by the Prolific service. After reading a short description of the study and its requirements, each participant provided their informed consent and was then linked to the survey. Data collection occurred at two timepoints separated by at least one week. All variables listed in the measures section below were assessed at Timepoint 1, and only the PAP-10 FWB measure was assessed at Timepoint 2.

Measures

Free Will Beliefs

Free Will and Determinism Scale (FAD-Plus). The same four items from the free will subscale of the FAD-Plus (Paulhus & Carey, 2011) were used to measure participant levels of the volition FWB factor. Participants indicated their level of agreement to each item on a 6-point scale (1 = strongly disagree, 6 = strongly agree) exemplified by: “*people have complete control over the decisions they make;*” and “*strength of mind can always overcome the body's desires.*” Scores were calculated by averaging participant responses across the items, with higher scores indicating greater volition FWB. For this sample, the measure produced an acceptable degree of inter-item reliability ($\alpha = .74$, $\omega = .74$).

The Principle of Alternative Possibilities Scale (PAPS-10). As the primary purpose of this study is to provide further validation and reliability testing of the new PAPS-10 FWB

measure, the PAPS-10 items supported by Study 2 of this work were included. This allowed for assessing the remaining questions of discriminant validity of the PAPS-10 with psychological constructs such as perceived control, trait self-control, self-mastery, future-mindedness, ruminative tendencies, as well as common personality and individual difference measures included for the reason of employing best practices.

The 10 PAPS items were used to measure participant levels of the PAPS FWB factor. Participants indicated their level of agreement to each item on a 6-point scale (1 = strongly disagree, 6 = strongly agree) and scores were calculated by averaging participant responses across the items, with higher scores indicating greater PAPS FWB. For this sample, the measure produced a high degree of inter-item reliability ($\alpha = .95$, $\omega = .95$).

PAPS-10 Criterion Validity. The psychological definitions for both the volition and PAPS FWB factors were used as criteria to assess the predictive/ criterion validity of the new PAPS-10 measure of FWB. Participants were presented with the psychological definitions for both FWB factors in unison and then rated their level of agreement with each FWB factor's definition (1=Strongly Disagree, 6 Strongly Agree). See appendix, page 124 for details.

Personal Control Perceptions and Beliefs

Locus of Control. The brief measure of Locus of Control (Lumpkin, 1988) was used to assess participant levels of perceived personal control over their lives. This was included to add further documentation of the conceptual and empirical distinction between FWB and LOC constructs. In this sample, this three item Likert scale was shown to have a high degree of inter-item reliability ($\alpha = .86$, $\omega = .86$) and is exemplified by: “*when I get what I want, it is usually because I worked hard for it.*” This brief internal LOC measure was assessed with a 6-point rating scale (1 = strongly disagree, 6 = strongly agree) and the average of the items was

calculated to serve as each participant's LOC score. Higher LOC scores indicated greater participant levels of perceived personal control.

Self-Mastery. Another common assessment of personal control beliefs is found in the Self-Mastery Scale (SMS, AKA the Personal Mastery Scale or Pearlin Mastery Scale, Pearlin & Schooler, 1978) and is frequently used in health research to assess the extent to which people believe they are in control of their own lives, or the degree to which one believes they can control life events and circumstances. Do the possibility of conceptual and empirical overlap between personal control beliefs and the PAP factor of FWB, this study assessed participant SMS scores. The 7-item Likert-type measure was assessed on a 6-point rating scale (1 = strongly agree, 6 = strongly disagree), exemplified by the following items: "*I can do just about anything I really set my mind to do,*" and "*what happens to me in the future mostly depends on me.*" In this sample, the SMS produced acceptable levels of inter-item agreement ($\alpha = .75$, $\omega = .74$).

Trait Level Self-Control. Self-control conceptualized as "*the self's capacity to override or change one's inner responses, as well as to interrupt undesired behavioral tendencies and to refrain from acting on them*" (Tangney, Baumeister, & Boone, 2004, p. 274). It could be the case that the PAP-10 is conceptually confounded with or inadvertently taps into trait-level self-control as opposed to belief in PAP. The Brief Self-Control Scale (BSCS, Tangney et al., 2004) was assessed to test this possibility and provide empirical evidence for the conceptual distinctiveness between the PAPS-10 and the BSCS. Focusing on the behavioral aspects of self-control (e.g., habit formation, task perseverance), the BSCS is a 13-item Likert-type measure that asks people to assess the degree to which a behavioral description corresponds to their own behavior. In this study, the measure was assessed with a 6-point scale (1 = Not at all, 6 = Very much) and produced a good degree of inter-item agreement ($\alpha = .78$, $\omega = .78$).

Temporal Perspectives and Orientations

Future-mindedness (aka prospection) is the uniquely human ability to generate and then evaluate mental representations of *possible futures* (emphasis added; Seligman, Railton, Baumeister & Sripada, 2016; Seligman, 2012); hence, future-mindedness. Do recall the PAP theme of FWB. As described by Baumeister and Monroe (2014), PAP FWB is a belief in the possibility of multiple courses of action stemming from the same present. The psychology of *future-mindedness* is a growing field (Osman, 2014; Wittmann & Butler, 2016; Macleod, 2017) with a literature reporting robust adaptive effects for well-being. Trait level future-mindedness, as well as training interventions oriented around future-mindedness, have been shown to increase motivation and adaptive decision-making strategies within goal-directed behaviors, and positive mental health outcomes across a range of normative sub-clinical conditions (Daugherty & Brase, 2010; Seligman & Csikszentmihalyi, 2014; Linley, Harrington & Wood, 2006; Visser & Hirsch, 2014; Spreng, Mar & Kim, 2009).

The PAP theme of FWB is suffused with clear notions of temporal distinctiveness, such as the belief in multiple possible futures and courses of action, as well as beliefs in the ontological possibility of true counter-factual statements (e.g., had one not partied last night, one would have gotten a better exam grade). As the PAP-10 was designed to assess this temporally laden facet of FWB, future-mindedness was assessed to obtain evidence of the conceptual distinctiveness between future-mindedness and PAP FWB.

Zimbardo Time Perception Inventory (ZTPI). This individual differences measure of temporal orientations assesses trait-level orientations to time that are affect laden (Zimbardo & Boyd, 1999). As a result, this 56-item inventory consists of five subscales designed to capture the affect laden aspects of time orientation, Those of Past-Negative, Past-Positive, Present-

Hedonistic, Present-Fatalistic, and Future. To attenuate concern over participant fatigue, only the Past-Negative, Past-Positive, and Future subscales were assessed. Participants respond to a Likert-type measure asking them to indicate the degree to which descriptions are characteristic of themselves. In this study, this measure was assessed on a 6-point scale (1 = very uncharacteristic, 6 = very characteristic) and produced adequate to good estimates of inter-item reliability in this sample ($\alpha / \omega = 0.74 - 0.82$).

Ruminative Tendencies

For much the same reasons put forward arguing for the inclusion of a time orientation assessment, so too should this work include an assessment of trait-level ruminative tendencies. Rumination involves one's mental time travel to the past for the purpose of engaging in maladaptive counter-factual thinking (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). While much of the research on counter-factual thinking revolves around its maladaptive engagement (i.e., rumination), research accumulated over the past decade has provided more nuance to the connection between counter-factual thinking and its maladaptive vs. adaptive effects. While it is indeed the case that rumination is a maladaptive form of counter-factual thinking, it is not the case that counter-factual thinking—just as such—is maladaptive. Rather, evidence suggests that when done for relatively short durations (free from repeated mental time-travel to the same event), counter-factual thinking is actually associated with adaptive outcomes for well-being.

The Ruminative Responses Scale. Individual differences in ruminative tendencies were assessed with the Ruminative Responses Scale (RRS, Treynor, Gonzalez, & Nolen-Hoeksema, 2003). This 10-item measure assesses two key dimensions of rumination, with 5 items assessing a maladaptive brooding form of rumination, and 5 items assessing a largely adaptive reflective form of rumination. Only the 5 reflective rumination items were used. Participants responded to a

Likert-type rating scale that asked them to indicate the degree to which they think or do the following when feeling down sad or depressed. In this study, this measure was assessed with a 6-point scale (1 = almost never, 6 = almost always). Reflective rumination is exemplified by “*go someplace alone to think about your feelings.*” For this sample, the measure produced a good degree of inter-item reliability ($\alpha = 0.83.$, $\omega = 0.82$).

Mindset

Research by Dweck and colleagues (1995, 1999, 2006) has reliably established the existence of an individual difference factor that can greatly shape one’s assumptions of what they are capable of and what is possible for them to achieve. This factor is referred to as one’s mindset. Mindsets align with either a growth perspective or a fixed perspective. A growth mindset holds to the perspective of inherent unfixeness of personal ability. Therefore, the growth mindset is marked by its belief in the potential for meaningful personal growth. The fixed perspective is the exact opposite and characterized by the belief in the inherent fixedness of personal ability. This growth vs. fixed dichotomy has the potential to be strongly correlated with FWB and the PAP FWB in particular. In light of this, the present research assessed individual differences in people’s mindset to provide evidence of satisfactory discriminant validity for the PAPS-10 from growth vs. fixed mindsets.

The Growth Mindset Scale. The 3-Item Growth Mindset Scale (Dweck, 1995, 1999, 2006) was used to assess the degree to which people view personal ability to be a fixed and static endowment vs. a dynamic and open-ended potentiality (1995, 1999, 2006). In this study, participants respond to this measure by way of a 6-point Likert-type agreement rating (1 = strongly disagree, 6 = strongly agree), exemplified by: “*People can do things differently, but the important parts of who they are can’t really be changed.*” This measure has been well evidence

as possessing good inter-item reliability, test-retest reliability, and repeated confirmations of construct validity (1995, 1999, 2006). In this sample, the measure produced a good degree of inter-item reliability ($\alpha = 0.77$, $\omega = 0.77$).

Big-5 Personality Traits

For the purpose of best practice, psychometric investigations into newly developed measures of trait-level constructs or pseudo-trait-level constructs (beliefs can often take on trait-like characteristics), should also include comparisons of the new measure with the core personality traits known as the BIG-5. These 5, and nearly universally agreed upon, personality factors are openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. This study assessed the Big-5 traits with the Big Five Inventory-10 (BFI-10, Rammstedt, & John, 2007), this short measure of the Big-5 traits produced good levels of inter-item reliability in this sample ($\alpha = 0.78-86$, $\omega = 0.77-85$)

Attention Checks

Inattentive responding is a methodological threat to internal validity surveys, especially online surveys. In this study, a participant was considered to be an inattentive responder if they answered survey questions with marked disregard for the content of the items (Berry et al., 2016; Huang et al., 2015). Inattentive responders can take a random approach to responding (i.e., random selection of response options) or a non-random approach to responding (i.e., systematic selection of the same response option). This can produce response patterns that may look like acquiescence, extreme responding, or fence sitting (Berry et al., 2016; Huang et al., 2015), but are in fact mere inattentiveness. Two different items aimed at assessing participant inattentiveness were used: “*Please choose ‘strongly disagree’ for this item*” and “*Please choose ‘strongly agree’ for this item*” (see Marjanovic, Struthers, Cribbie, & Greenglass, 2014). Both items were used

twice throughout the survey and were done so at random. Responses other than “strongly disagree” (i.e., for the question “*Please choose ‘strongly disagree’ for this item*”) and “strongly agree” (i.e., for the question “*Please choose ‘strongly agree’ for this item*”) were classified as random and then assumed to indicate participant inattentiveness. This research used a very conservative standard for determining inattentiveness. Participants needed to pass all four of these questions to be included in the final analyses.

Data Analyses

After screening that data for inattentive participants, the final sample size was 212. The data was checked for meeting the assumptions of the general linear model and passed all assumption checks. Factor scores for all measures were achieved using the average score (as opposed to sum scores) for each participant across each of the respective measures. Hypothesis 1 was assessed with a confirmatory factor analysis to see if the PAPS-10 factor structure replicated here. Hypothesis 2 and 3 were tested with a series of Pearson correlation coefficients to estimate the relationship of the PAPS-10 to all the other included measures. Hypothesis 4 was also assessed with a Pearson correlation to estimate the degree of temporal stability between Timepoint 1 and Timepoint 2 PAPS-10 scores.

Results

Hypothesis 1 predicted that the factor structure of the PAPS-10 would be replicated. The confirmatory factor analysis provided strong evidence in support of this hypothesis, as the entirety of the PAPS-10 factor structure observed in Studies 1 and 2 were replicated here. This finding indicates that the factor structure of the PAPS-10 produces a reliable depiction of peoples PAP FWB. See table 3.2 on 112 for for factor loadings and fit indices.

Hypotheses 2 and 3 were all about validity. Hypothesis 2 stated that the coefficient estimates for participant scores of the PAPS-10 to participant scores of all other measures assessed in this proposed study (e.g., LOC, self-control, mindset, rumination) would show satisfactory levels of discriminant validity (i.e., $\leq .45$). The correlations in table 3.3 on page 113 show that each of the association in question are below the threshold of redundancy/ conceptual indistinctiveness. Hypothesis 3 stated that people's agreement with the definition of PAP would be strongly and positively predicted by their PAPS-10 scores. The results of this study supported this hypothesis; the greater one's PAPS-10 score, the more like they were to agree with the PAP definition of free will ($r = .82-.80, p < .05$). This predictive ability of the PAPS-10 is afforded even greater meaning when considering the measure's predictive ability of the volition definition of free will—a strong but comparatively weaker predictor of participant agreement with volition free will ($r = .55-.53, p < .05$). due the sizable difference between the PAPS-10 predictive ability See table 3.4 on page 114 for the criterion validity coefficients.

Lastly, hypothesis 4 predicted that the coefficient estimates for peoples PAPS-10 scores at Timepoint 1 and Timepoint 2 PAPS-10 scores would be greater than a medium effect size and thereby show satisfactory test-retest stability. The Pearson correlation supported this hypothesis ($r = .89, p < .05$), indicating that the PAPS-10 has a good degree of temporal stability/ test-retest reliability. This finding suggests that the PAPS-10 can be depended upon to provide a temporally stable assessment of peoples PAP FWB.

Discussion

The results of this research provide evidence of the PAPS-10 as a valid and reliable measure of peoples PAP FWB. The single factor structure of the PAPS-10 was well supported, with all 10 PAP items indicating high loadings ($\lambda = 0.77 - 0.915$). This study showed that the

PAPS-10 is conceptually and empirically distinct from other psychological phenomena that had the potential to confound the measure (e.g., self-control, mindset, future mindedness, ruminative tendencies). This study also provided good evidence for the predictive/ criterion validity of the PAPS-10, as the measure was able to strongly predict people's agreement with the PAP definition of free will. Lastly, this study showed that the PAPS-10 enjoys very good temporal stability/ test-retest reliability. Overall, this study provides valuable knowledge for FWB research, as researchers can now more accurately measure FWB.

Brief Review: From Study 1 to Study 4

To be properly acquainted to the aims of Study 4, a very brief review of the primary goals of studies 1-3 will likely prove helpful. Study 1 set out to both add to the evidence base indicating associations between FWB and well-being, as well as develop a measure of FWB designed to capture the PAP theme of FWB. Study 1 was successful, evidencing the positive association among FWB and well-being, as well as providing preliminary evidence for the usefulness of the PAPS-10. Study 2 set out to replicate Study 1 and did exactly that. Study 3 then further replicated, validated (assessing discriminant validity), and assessed the reliability (internal and test-retest) of the PAPS-10 FWB measure.

The focal aims of this four-study dissertation project were to: 1) add to the evidence base indicating associations between free will belief and well-being; 2) develop a measure of FWB designed to capture the PAP theme of FWB; 3) provide a substantive theoretical framework for understanding the free will belief and well-being relation; and 4) experimentally test this newly developed theoretical framework and investigate the potential casual free will belief to well-being relation.

Focal aims 1 and 2 were accomplished through Study 1 and then replicated by Study 2. Focal aim 3 was addressed in the introduction (refer to pages 19-24). Specifically, I developed the purpose-imbuing model of FWB to provide a coherent synthesis of the pertinent philosophical and scientific work regarding the nomological structure of FWB, meaning in life, and well-being. After describing the purpose-imbuing model of FWB and its ability to provide a theoretical and mechanistic explanation of the FWB-SWB relationship, I then posited that the worldview-conflict model may pose a reasonable explanatory challenge to the purpose-imbuing model. Importantly, clear predictions of each model were discussed and contrasted with each other to construct a well-rounded experimental design that was then implemented in Study 4.

Review of the Purpose-imbuing model of FWB and its Predictions

The purpose-imbuing model of FWB claims that the primary intrapersonal function of FWB is to imbue life with meaning and that the adaptive function of FWB is due to the meaning afforded by FWB. The model is therefore inherently mediational. Specifically, in its positive formulation, the model predicts that stronger FWB leads to increased meaning in life and that increased meaning in life then leads to more adaptive SWB. In its negative formulation, the model predicts that weaker FWB leads to decreased meaning in life and that decreased meaning in life then leads to less adaptive SWB.

When applied to the experimental manipulation of FWB and its downstream effects on SWB, the purpose-imbuing model provides 2 key predictions. First, an anti-FWB manipulation would result in decreased meaning in life (compared to a control condition) which in turn would result in decreased SWB (compared to a control condition). Second, a pro-FWB manipulation would result in increased meaning in life (compared to a control condition) which in turn would result in increased SWB (compared to a control condition). This is contrasted by the worldview-

conflict model which would primarily predict that an anti-FWB manipulation would result in increased negative affect (compared to a control group) which would then result in decreased SWB (compared to a control group).

The tension between the models is found in their predictions for the anti-FWB manipulation. Specifically, if the only effect found was the one predicted for the anti-FWB manipulation, one could reasonably claim that the purpose-imbuing model is an inferior explanation of the data than the worldview-conflict model. However, if the effect predicted for the anti-FWB manipulation by the purpose-imbuing model can be shown in the face of controlling for negative affect (i.e., the mediating variable from the worldview-threat model) that would provide evidence in favor of the purpose-imbuing model of FWB.

Overview of Study 4

The central aim of Study 4 was to experimentally assess the competing models of FWB and well-being; that is, the purpose-imbuing model of FWB and SWB vs. the worldview-conflict model of FWB and SWB. An experimental mediation methodology was used to infer the causal validity of FWB on SWB and determine the explanatory utility of the purpose-imbuing model of FWB. To accomplish this, the well validated Velten-like FWB manipulation with three conditions (pro-FWB, anti-FWB, and neutral control; Alquist et al., 2014; Buttrick, 2016; Vohs & Schooler, 2008) was used and then meaning in life, negative affect, and indicators of well-being were assessed. Using a 3 X Continuous between-groups design, I hypothesized:

H₁: People in the pro-FWB group will report higher FWB than people in the control group; serving as evidence of an effective pro-FWB manipulation.

H₂: People in the anti-FWB group will report lower FWB than people in the control group; serving as evidence of an effective anti-FWB manipulation.

- H3:** People in the pro-FWB group will report higher meaning in life than people in the control group.
- H4:** People in the anti-FWB group will report lower meaning in life than people in the control group.
- H5:** People in the pro-FWB group will report more adaptive SWB than people in the control group.
- H6:** People in the anti-FWB group will report less adaptive SWB than people in the control group.
- H7:** The effect predicted for the pro-FWB group's SWB will be mediated by meaning in life. Specifically, people in the pro-FWB group will report more adaptive SWB (compared to the control group) due to the pro-FWB manipulation bolstering their perceived meaning in life (compared to the control group). Such a result would provide evidence in support of the purpose-imbuing model.
- H8:** The effect predicted for the anti-FWB group's SWB will be mediated by meaning in life. Specifically, people in the anti-FWB group will report less adaptive SWB (compared to the control group) due to the anti-FWB manipulation diminishing their perceived meaning in life (compared to the control group). Such a result would provide evidence in support of the purpose-imbuing model.
- H9:** The mediation effect for the pro-FWB group will remain after accounting for negative affect; providing evidence for the explanatory superiority of the purpose-imbuing model over that of the worldview-conflict model.

H₁₀: The mediation effect for the anti-FWB group will remain after accounting for negative affect; providing evidence for the explanatory superiority of the purpose-imbuing model over that of the worldview-conflict model.

Method

Participants

A nationally representative sample of United States citizens, of at least 18 years of age, was collected for this study. Like the previous study, participants were recruited from Prolific (<https://prolific.co/>) and compensated \$6 for their time.

Materials and Procedure

This study was an online-based experiment using a 3 (i.e., pro-FWB vs. anti-FWB, vs. control) X Continuous (i.e., meaning in life) between-groups design. The survey was implemented through Qualtrics and disseminated by Prolific. After reading a short description of the study, people opting to become participants were directed to an informed consent process and then routed to the study's survey in Qualtrics. From the perspective of participants, the study felt much like a simple survey directing them through a collection of questionnaires. However, the branching functions of Qualtrics were used to randomly assign participants to one of three FWB manipulation conditions (i.e., pro-FWB vs. anti-FWB vs. control), resulting in an experimental online survey methodology. The FWB manipulation procedure was an online version of the same Velten-like technique used and validated in previous research (e.g., Alquist et al., 2014; Buttrick, 2016; Vohs & Schooler, 2008). This manipulation procedure has been used in online research many times and results in effect sizes (for differences in FWB) that are equivalent to those optioned by the in-person laboratory-based version of the manipulation (Genschow et al., 2021).

In each condition, participants were asked to read, reflect upon, and then rephrase, 10 statements that comport to the FWB manipulation of relevance. The statements either affirmed, refuted, or had nothing to do with the concept of free will (pro-FWB, anti-FWB, and control conditions; respectively). Participants were presented each statement for 30 seconds. After that time, a text entry box appeared for the participants to rephrase the statements in their own words.

Items exemplifying the pro-FWB condition are: “the most current knowledge from physics supports indeterminacy is a core property of reality, making human free will entirely plausible.” And “The first-person experience of free will is just as self-evident as the experience of water’s wetness.” Items exemplifying the anti-FWB condition are: “Ultimately, we are biological computers—designed by evolution, built through genetics, and programmed by the environment.” And “A belief in free will contradicts the known fact that the universe is governed by lawful principles of science. Items exemplifying the control condition are: “Monarch butterflies fly slowly but have been sighted hundreds of miles at sea.” And “Most appliances are guaranteed for a full year against defects.”

After experiencing one of the three FWB manipulations, participants then completed a manipulation check, as well as a series of measures aimed at assessing meaning in life, negative affect, and indicators of well-being. Lastly, participants reported demographic characteristics. Upon completion of the study, each participant was paid \$6 as compensation for their time.

Measures

Free Will Beliefs: Manipulation Check

Free Will and Determinism Scale (FAD-Plus). Four items from the free will subscale from the Free Will and Determinism Scale (FAD-Plus; Paulhus & Carey, 2011) were used to

measure the volition FWB factor and serve as a manipulation check. This measure was used here in the exact same way that it was in the previous three studies.

The Principle of Alternative Possibilities Scale (PAPS-10). The new PAPS-10 measure was used to measure the PAP FWB factor and to also serve as another manipulation check. This measure was used here in the exact same way that it was in the previous three studies.

Subjective Well-Being

Life Satisfaction. The Satisfaction with Life Scale (SWLS; Diener et al., 1985; Pavot, & Diener, 2008), was used as a positive indicator of eudaimonic well-being. Participants will respond to this measure with a 6-point Likert-type scaling (1 = Strongly disagree, 6 = Strongly agree). This measure was used here in the exact same way that it was in Studies 1 and 2.

Perceived Quality of Life. The Cantril Self-Anchoring Striving Scale (Cantril, 1965) was used to assess participant perceptions of their quality of life, serving as a positive indicator of hedonic well-being. This single item measure asks participants to imagine a ladder with 10 steps for which the bottom step represents “the worst possible life for you” and the top step represents “the best possible life for you.” Participants are then asked, “*on which step of the ladder would you say you personally feel you stand at this time?*” Participants then indicate their perceived quality of life on a 10-point scale (1 = Worst possible life, 10 = Best possible life).

Perceived State of Well-Being. Four items from the State-Trait Anxiety Inventory (STAI, Spielberger et al, 1974) was used to assess participant perceptions of their subjective hedonic well-being. As most of the items from this measure possess significant conceptual overlap with the PANAS, only four items that were free of such conceptual overlap (tapping state perceptions of well-being) were used. These items were: “I feel secure”, “I feel satisfied”, “I feel self-

confident”, and “I feel content”. Participants will rate the degree to which they agree to these items using a 6-point Likert-type format.

Meaning in Life

The Meaning in Life Questionnaire (MLQ, Steger, 2006) was used to assess the degree to which participants feel their lives are significant and purposeful. This 10-item measure assesses two distinct dimensions of meaning, those of presence of meaning, and the search for meaning. In this study, participants will record their responses on a 6-point Likert-type scale (1 = Absolutely True, 6 = Absolutely Untrue). Items for the MLQ are exemplified by the following: “*I understand my life’s meaning,*” and “*My life has a clear sense of purpose.*”

Current Affective State

The negative affect items of the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988) were used to assess participant’s in vivo negative affect. For this 10-item measure, participants are presented single words (e.g., irritable, upset) and then asked to rate the degree to which they are currently experiencing said affective state on a 6-point Likert-type scale (1 = Very slightly or Not at all, 6 = Extremely).

Perceived Personal Control

The brief measure of Locus of Control (Lumpkin, 1988) will be used to assess participants levels of perceived personal control over their lives. This will be included to add further the documentation of the conceptual and empirical distinction between FWB and LOC constructs. This measure was used here in the exact same way that it was in the previous three studies.

Data Analytic Approach

The original data analytic plan for this section of my dissertation project was proposed to be an assessment of structural invariance by way of SEM. The primary reasoning for this analytic approach was the advantage of the SEM framework when it comes to measuring a construct with several factors serving as indicators of said construct. In my case, I thought that the presence three well-being measures (i.e., SWLS, Cantril ladder, STAI) in my model would be best served within an SEM framework. However, the measurement model did not yield good fit because the three well-being measures did not converge into a single well-being factor (all $\lambda < .3$).

As a result of this feature of my data, I chose to proceed with the general linear model and conduct a mediation model with the experimental manipulation groups serving as a multi-categorical predictor using ordinary least squares regression. The coding scheme for the multi-categorical FWB manipulation variable was 0 = Control Group, 1 = Anti-FWB Group, 2 = Pro-FWB Group. I used this dummy coding scheme for ease of interpretation, as the general linear model inherently uses 0 for a reference category (Cohen, Cohen, West, & Aiken, 2003; Hayes, 2018). This results in the other groups being compared to the reference group only, which in this case is the control group (i.e., no FWB manipulation). Also, within ordinary least squares regression with a multi-categorical variable wherein 0 is the reference group dummy code, the sign of coefficients conveys the difference of a comparison group to the reference group (Cohen, Cohen, West, & Aiken, 2003; Hayes, 2018). As a result of this feature of the general linear model, a negative coefficient indicates that the comparison group has a lower mean than the reference group on the outcome variable (be it a mediator variable or a dependent variable). Conversely, a positive coefficient indicates that the comparison group has a higher mean on the outcome variable than the reference group.

For the hypotheses I am testing with this data, the functions of the general linear model just discussed dictate that negative coefficients should be seen for the Anti-FWB group vs. Control group comparisons and positive coefficients for the Pro-FWB group vs. Control group comparisons. Such findings would indicate that the Anti-FWB group reported less meaning in life and/or less well-being than the Control group and that the Pro-FWB group reported greater meaning in life and/or less well-being than the Control group.

The data was checked for meeting the assumptions of the general linear model and was found to be satisfactorily normal (skewness = .96-1.23; kurtosis = 1.4-1.6). Participant responses were checked for inattentiveness and 3 were removed due to failing the attention check items, resulting in a final sample size of 612.

Results

The manipulation checks were assessed with two One-Way ANOVAs. The experimental conditions produced significant differences within the FAD measure [$F(2, 609) = 32, p < .001$], as well as the PAPS-10 measure [$F(2, 609) = 927, p < .001$]. The anti-FWB group (M FAD = 2.57, M PAPS = 4.10) reported significantly lower FWB than the control group (M FAD = 3.11, M PAPS = 4.89). Also, the pro-FWB group (M FAD = 3.29, M PAPS = 5.58) reported significantly higher FWB than the control group. These results indicate that the FWB manipulation procedures in this study were effective in changing participant FWB.

Pearson correlations with all primary variables were computed to see if all three indicators of well-being should be assessed as outcomes in a condition mediation model. The correlation matrix indicated significant relations between the experimental condition, meaning in life, eudainomic well-being (assessed with SWLS), as well as one of the indicators of hedonic well-being (i.e., perceived quality of life assessed with the Cantril ladder. However, no relations

of interest were observed for the second hedonic well-being measure that assessed state anxiety. As a result, only satisfaction with life and quality of life (eudainomic and hedonic well-being, respectively) were estimated with mediation models with the FWB manipulation conditions serving as a multi-categorical predictor. See table 4.2 on page 116 for all coefficients.

Conditional Mediation Model for Eudainomic Well-Being

A mediation model was constructed in Jamovi 2.3.13 to see if the experimental FWB groups differed in their levels of satisfaction with life and if this difference was mediated by their levels of meaning in life. The overall model was significant. Group differences in meaning in life and satisfaction with life were found for the experimental FWB conditions in the directions predicted. Compared to the control group, the anti-FWB group reported significantly less meaning in life and satisfaction with life. Moreover, the effect for the anti-FWB manipulation on satisfaction with life was also mediated by the effect of the anti-FWB manipulation on meaning in life. Specifically, and as predicted, the anti-FWB manipulation produced decreased satisfaction with life and this decrease was mediated through the mechanism of meaning in life; such that disbelief in free will produced decreased meaning and in turn decreased satisfaction.

Compared to the control group, the pro-FWB group reported significantly greater meaning in life and satisfaction with life. Also, the effect for the pro-FWB manipulation on satisfaction with life was also mediated by the effect of the manipulation on meaning in life. Specifically, and as predicted, the pro-FWB manipulation produced increased satisfaction with life and this increase was mediated through the mechanism of meaning in life; such that bolstered belief in free will produced increased meaning and in turn increased satisfaction. See Table 4.3 on page 117 for coefficients and Figure 4.1 on page 100 for a depiction.

Conditional Mediation Model for Hedonic Well-Being

Another mediation model was constructed in Jamovi 2.3.13 to see if the experimental FWB groups differed in their levels of perceived quality of life and if that difference was mediated by their levels of meaning in life. Once again, the conditional mediation model was significant. Group differences in meaning in life and perceived quality of life were found for the experimental FWB conditions, and in the directions that were predicted. Compared to the control group, the anti-FWB group reported significantly less meaning in life and perceived quality of life. Moreover, the effect for the anti-FWB manipulation on participants perceived quality of life was also mediated by the manipulations negative effect on meaning in life. Specifically, and as predicted, the anti-FWB manipulation produced decreased perceived quality of life and this decrease was mediated through the mechanism of meaning in life; such that disbelief in free will produced decreased meaning and in turn decreased quality.

Compared to the control group, the pro-FWB group reported significantly greater meaning in life and perceived quality in life. Also, the effect for the pro-FWB manipulation on perceived quality of life was also mediated by the manipulation's effect on meaning in life. Specifically, and as predicted, the pro-FWB manipulation produced increased perceived quality of life and this increase was mediated through the mechanism of meaning in life; such that bolstered belief in free will produced increased meaning and in turn increased perceived quality. See Table 4.4 on page 118 for coefficients and Figure 4.2 on page 101 for a depiction.

Discussion

The results of Study 4 supported the stated hypotheses. First, the FWB manipulations were effective at altering the participants FWB and, importantly, the PAPS-10 served to be a good check of this manipulation. This result serves to simultaneously bolster both the confidence

in the Velten-like procedure for manipulating FWB and the validity of the PAPS-10 as a measure of the FWB factor known as PAP.

Most importantly, this research provides experimental evidence suggesting that belief in free will results in both increased eudainomic well-being, as well as increased hedonic well-being. By manipulating FWB, this study reveals that undermining peoples FWB results in decreased meaning in life and decreased life satisfaction (i.e., eudainomic well-being), and bolstering peoples FWB results in increased meaning and therefore increased satisfaction with life (i.e., eudainomic well-being). Moreover, in addition to the important direct effects observed by this research, this work also provides good evidence that one of the primary mechanisms for the causal FWB to well-being relationships is that of meaning in life. This research has shown that the causal connection between FWB and both eudainomic and hedonic well-being is in no small part due to the strong connection between FWB and meaning in life. This data suggests that the meaningful life is a life of quality and satisfaction. Furthermore, theorists for at least a century have also postulated that, just as the meaningful life is a satisfied one, so too is a free life a meaningful one. This research validates those theorists and provides evidence that this connection may well be real, as well as casual.

However, this research while, in my view notable, must be taken with the standard amount of scientific skepticism. Although this work, primarily that of Study 4, should be replicated, it also has great potential for generating further hypotheses and increasing knowledge of both FWB and well-being. One important note was the success of the purpose-imbuing model of FWB on well-being over that of the worldview-conflict model. Now, neither model necessitates the exclusion of the other, and both may be functioning in tandem or in interaction with one another. However, this research does show that the purpose-imbuing model does

explain a respectable degree of the FWB to well-being causal connection. Furthermore, the purpose-imbuing model was robust, remaining intact even when controlling for people's negative affect—the primary mechanism of the worldview-conflict model. While this finding does not serve to invalidate the world-view conflict model of FWB on well-being, it does serve to invalidate the thought that emotion and inner conflict is the only or even primary variable of importance. In my view, this research demonstrates the importance and potential robustness of the purpose-imbuing function of FWB.

General Discussion

The focal aims of this four-study dissertation project were to: 1) add to the evidence base indicating associations between free will belief and well-being; 2) develop a measure of FWB designed to capture the PAP theme of FWB; 3) provide a substantive theoretical framework for understanding the free will belief and well-being relation; and 4) experimentally test this newly developed theoretical framework and investigate the potential casual free will belief to well-being relation.

Focal aims 1 and 2 were accomplished through Study 1 and then replicated by Study 2. Studies 1 and 2 set out to both add to the evidence base indicating associations between FWB and well-being, as well as develop a measure of FWB designed to capture the PAP theme of FWB. Study 1 was successful, evidencing the positive association among FWB and well-being, as well as providing preliminary evidence for the usefulness of the PAPS-10. Study 3 then further replicated, validated (assessing criterion validity and discriminant validity), and assessed the reliability (internal and test-retest) of the PAPS-10 FWB measure.

Focal aims 3 and four were accomplished with Study 4. The purpose-imbuing model of FWB posits that the primary intrapersonal function of FWB is to imbue life with meaning and

that the adaptive function of FWB is due to the meaning afforded by FWB. I tested this theory in Study 4 and it was found credible. However, this work needs to be replicated and extended.

Future work should investigate two general questions. First, to what extent, if any, would differences in people's baseline FWB moderate the overall phenomenon I captured in Study 4. Might free will disbelievers versus free will believers show differing patterns regarding the purpose-imbuing vs. worldview-conflict model of FWB on well-being? Second, how might the purpose-imbuing model be scrutinized within a within-persons framework? What effect, if any, might volatility in one's FWB (or other worldview level beliefs for that matter) have on one's well-being? Might more, as opposed to less volatility (i.e., relatively sizeable fluctuations over relatively short time spans) negatively affect well-being (cf. research on self-esteem stability; Kernis et al., 1991)?

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Appendix A: Figures

Figure 1. Depiction of the Purpose-Imbuing Model of Free Will Belief

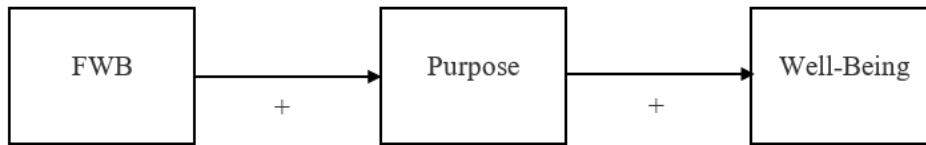


Figure 1.2. Depiction of the Worldview-Conflict Model of Free Will Belief

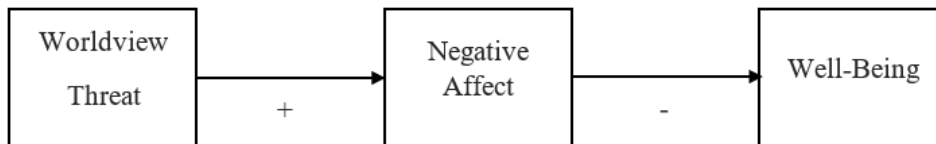
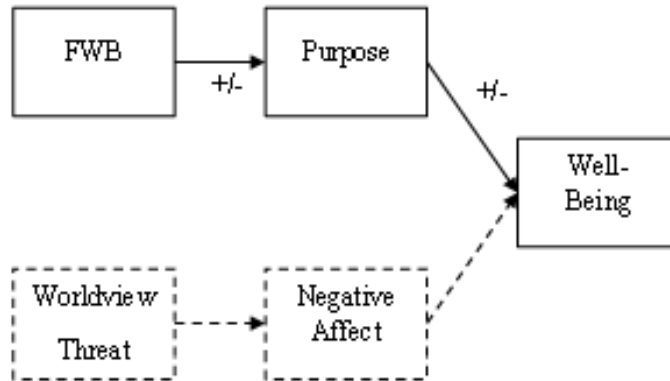
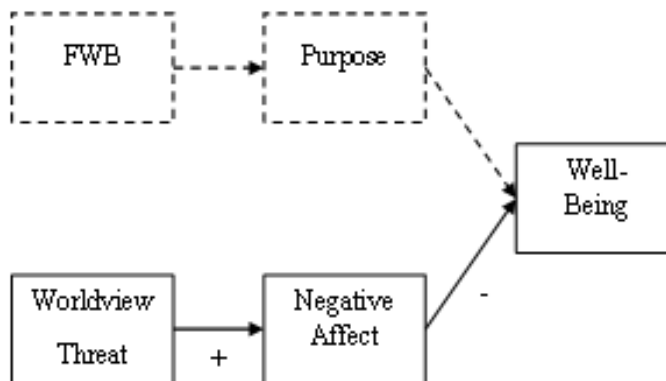


Figure 1.3. *Contrasting Evidence for the Purpose-Imbuing vs. Worldview-Conflict Models*

Evidence in Favor of the Purpose-Imbuing Model



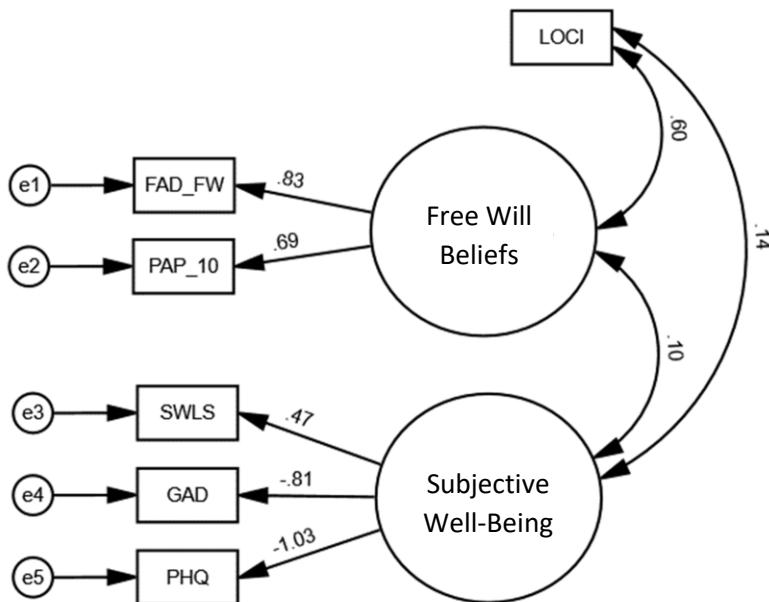
Evidence in Favor of the Worldview-Conflict Model



Notes. Dotted outlines intended to communicate non-significance.

Figure 1.4.

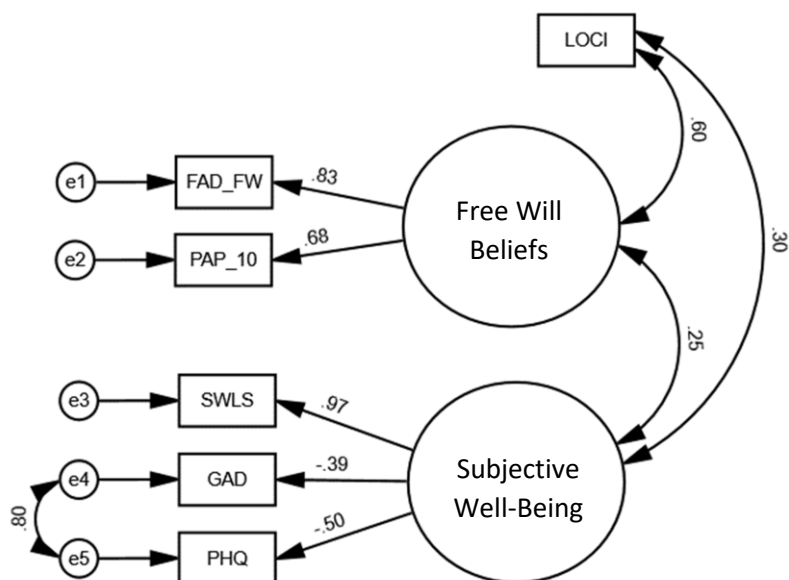
Measurement Model 1: FWB and Subjective Well-Being.



Note. Values are standardized β weights. Unstandardized b weights reported in text. Model fit statistics were: RMSEA = .104, indicating poor fit. RMR = .046, indicating good fit. NFI = .963, IFI = .966, CFI = .966, GFI = .974, all indicating good fit. AGFI = .923, indicating adequate fit. AIC = 109.545 and should be compared to the AIC value of measurement model 2. For this model, $\chi^2(7) = 81.55$, $p < .001$.

Figure 1.5

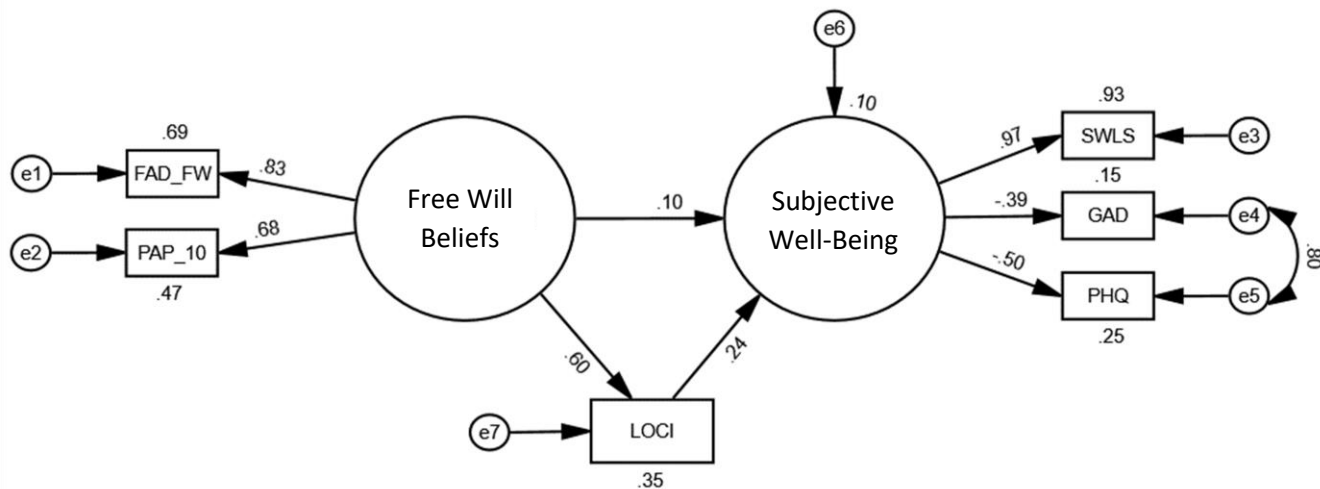
Measurement Model 2: FWB and Subjective Well-Being.



Note. Error terms for anxiety and depression are correlated. Values are standardized β weights. Unstandardized b weights reported in text. Model fit statistics were: RMSEA = .025, indicating good fit. RMR = .007, indicating good fit. NFI = .996, IFI = .998, CFI = .996, GFI = .997, and AGFI = .989, all indicating good fit. AIC = 39.697 and is smaller than in measurement model 1, indicating better fit. For this model, $\chi^2(6) = 9.70$, $p = .138$.

Figure 1.6.

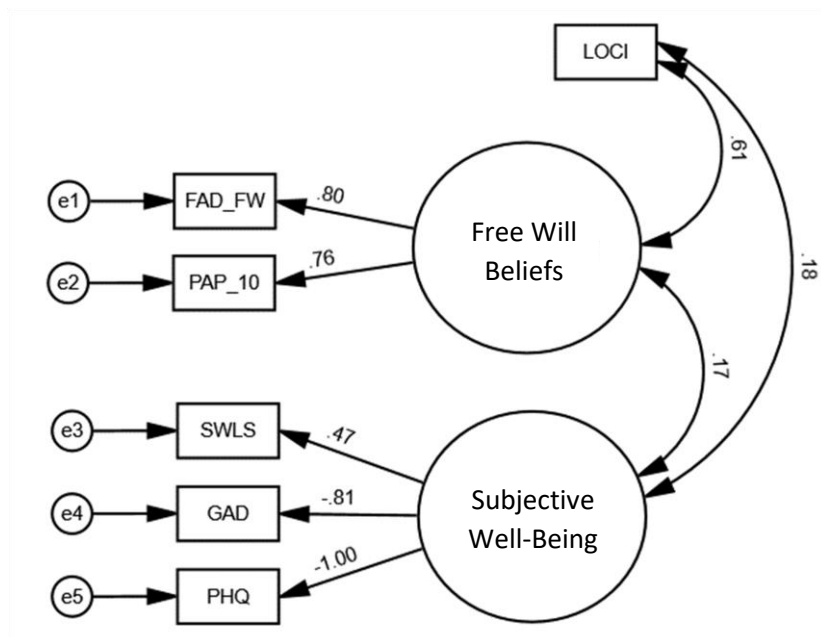
Structural Model: FWB and Subjective Well-Being.



Note. Error terms for anxiety and depression are correlated. Values are standardized β weights. Unstandardized b weights reported in text. Model fit statistics were: RMSEA = .025, indicating good fit. NFI = .996, IFI = .998, CFI = .998, indicating good fit. AIC = 51.70. For this model, $\chi^2(6) = 9.70, p = .138$.

Figure 2.1.

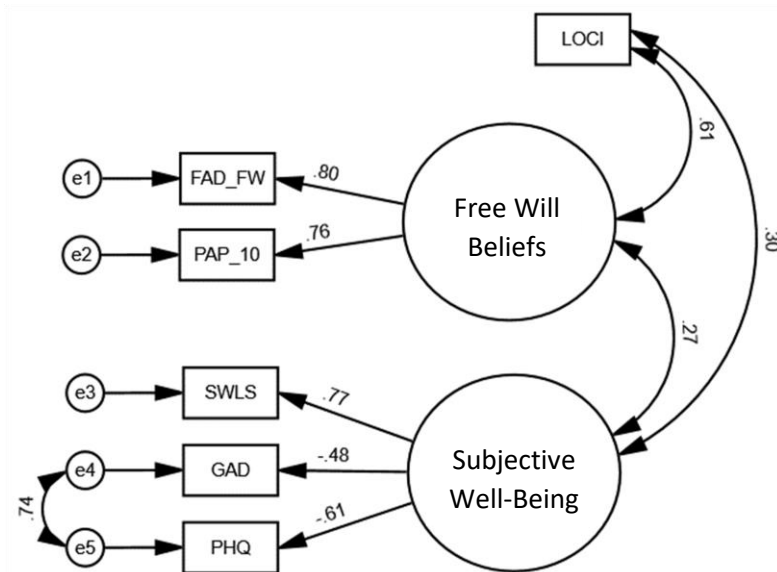
Measurement Model 1: FWB and Subjective Well-Being.



Note. Values are standardized β weights. Unstandardized b weights reported in text. Model fit statistics were: RMSEA = .065, indicating satisfactory fit; RMR = .033, indicating good fit; NFI = .982, IFI = .986, CFI = .986, GFI = .987, AGFI = .962, indicating good fit; AIC = 57.64 and should be compared to the AIC value of measurement model 2. For this model, $\chi^2(7) = 29.65, p < .001$.

Figure 2.2.

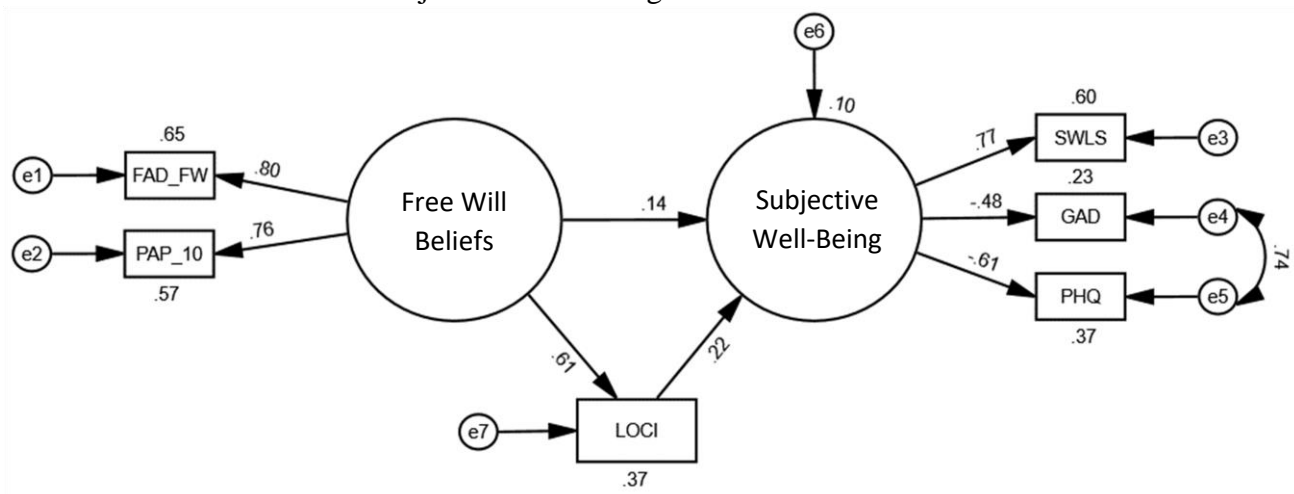
Measurement Model 2: FWB and Subjective Well-Being.



Note. Error terms for anxiety and depression are correlated. All values are standardized β weights. The unstandardized b weights reported in the text. Model fit statistics were: RMSEA = .000, indicating great fit; RMR = .007, indicating great fit; NFI = .997, IFI = .1.00, CFI = 1.00, GFI = .998, AGFI = .992, indicating great fit; AIC = 35.27, and is smaller than that of the first measurement model, indicating better fit. For this model, $\chi^2(6) = 5.27$, $p = .510$.

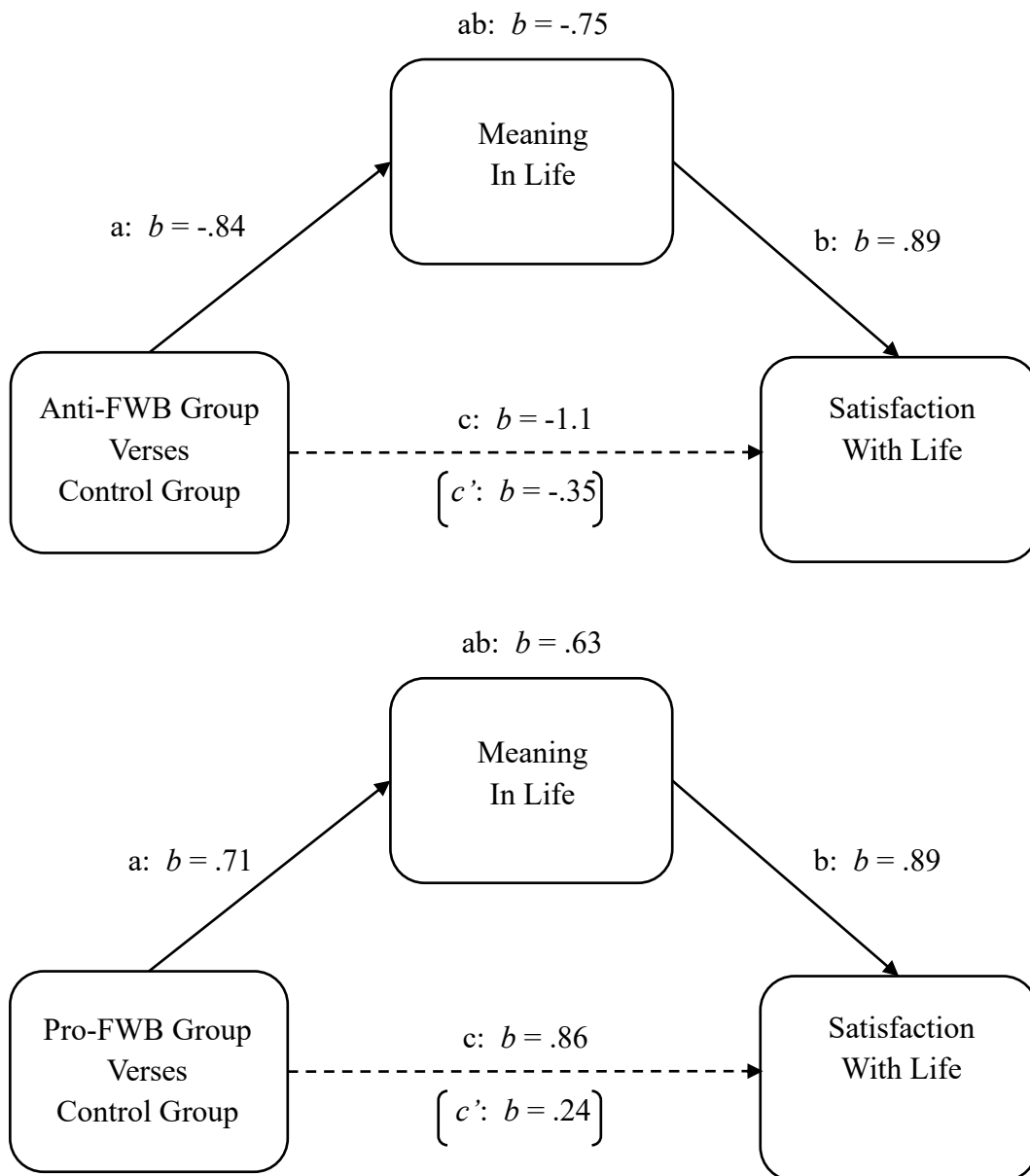
Figure 3.

Structural Model: FWB and Subjective Well-Being.



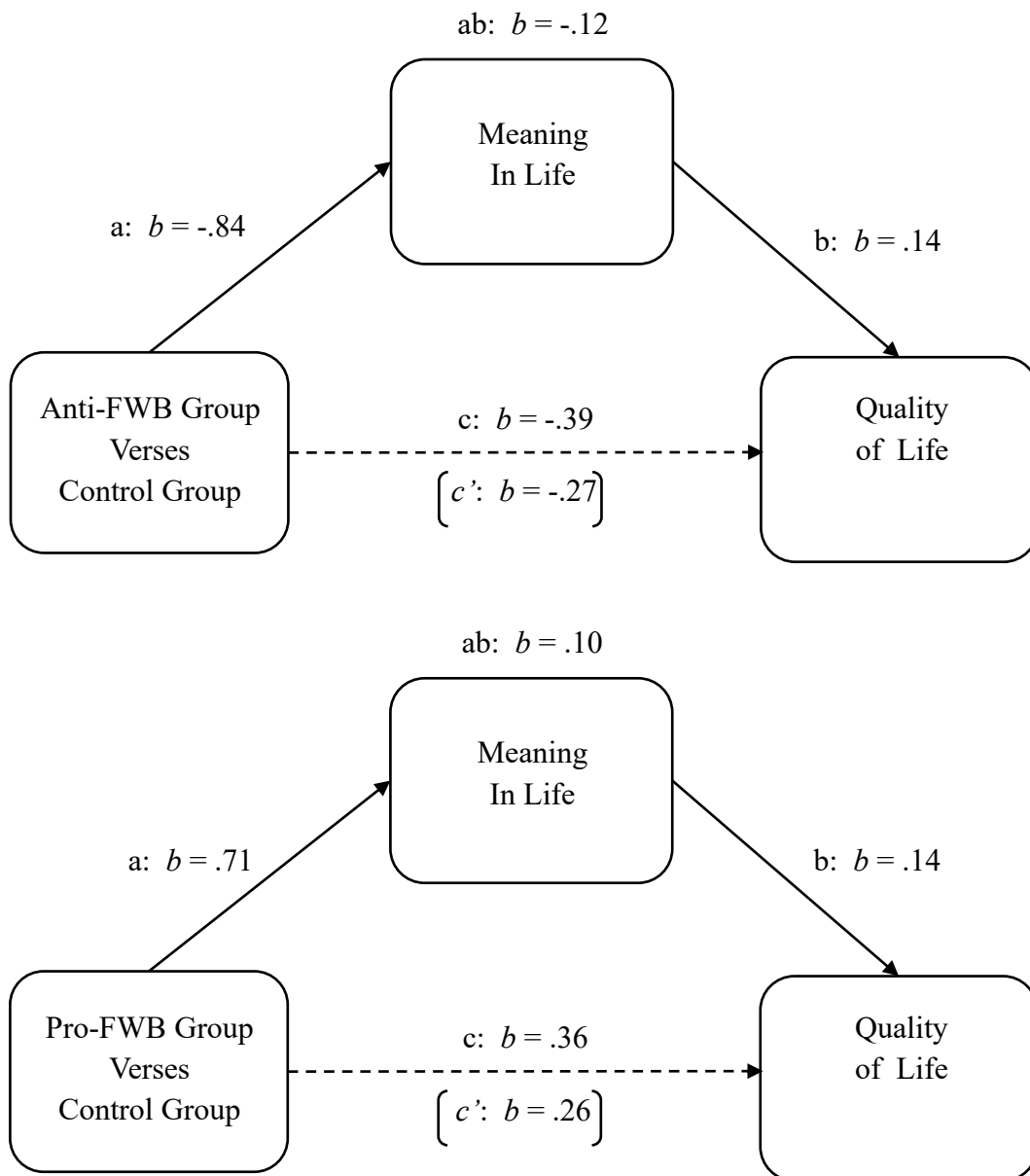
Note. Error terms for anxiety and depression are correlated. All values are standardized β weights. The unstandardized b weights reported in the text. Model fit statistics were: RMSEA = .000, indicating great fit; NFI = .997, IFI = 1.00, CFI = 1.00, indicating great fit. For this model, $\chi^2(6) = 5.27, p = .510$.

Figure 4.1. Mediation Model for Eudaimonic Well-Being



Note. All path coefficients above are $p < .001$. All paths remained significant after controlling for state emotion.

Figure 4.2. Mediation Model for Hedonic Well-Being



Note. All path coefficients above are $p < .001$. All paths remained significant after controlling for state emotion.

Appendix B: Tables

Table 1.1 Full PAP Item Pool

Item Identifier

| | |
|---------|---|
| PAP_1 | People could have made different decisions than the ones they actually made. |
| PAP_2 | People’s past behavior could have been different. |
| PAP_3 | People could have chosen a different path that would have led to a different present. |
| PAP_4 | The past is set in stone but those who built it could have done differently. |
| PAP_5 | Just because a person did a certain action does not mean that they had to do it. |
| PAP_6 | People could have done things in the past that would have allowed them more control in the present. |
| PAP_7 | People can limit the influence of the past. |
| PAP_8 | People can choose to make a real difference because the future is not set in stone. |
| PAP_9 | There are many possible futures that people can make real through free will. |
| PAP_10 | There are different futures that people can bring about through free choice. |
| PAP_11 | What happens in the future will happen because people will choose to make it happen. |
| PAP_12 | People can choose to guide their future toward a goal. |
| PAP_13 | People can co-create the future through their free choice. |
| PAP_14 | People can freely choose how they respond to situations. |
| PAP_15 | People can choose to act one way or another way. |
| PAP_16 | People could always decide to refrain from a given action. |
| PAP_17 | Even if people cannot choose to want what they want, they can still choose how they will act. |
| PAP_18 | Free will and free choice are the same thing. |
| PAP_19 | Free will is based upon the ability to choose one path over another. |
| PAP_20 | People can choose to say no to their own wants and desires. |
| PAP_21 | People can choose to deny themselves the things they want. |
| PAP_22 | Self-control is based on free will. |
| PAP_23 | Just because someone will do a certain thing does not mean that they must do it. |
| *PAP_24 | The “ability to have done otherwise” is needed for responsibility. |
| *PAP_25 | A person can only be held accountable for an action if they were “able to do otherwise.” |
| *PAP_26 | Human responsibility requires free choice. |
| *PAP_27 | Every person can do good or bad—it’s simply up to them. |

Note. *Dropped due to expert review.

Table 1.2. Factor Loadings for Single PAP Factor Solution

| Identifier | Item | Factor 1 | Communalities |
|------------|---|-------------|---------------|
| PAP_1 | People could have made different decisions than the ones they actually made. | .698 | .488 |
| PAP_2 | People's past behavior could have been different. | .617 | .380 |
| PAP_3 | People could have chosen a different path that would have led to a different present. | .639 | .409 |
| PAP_4 | The past is set in stone but those who built it could have done differently. | .412 | .170 |
| PAP_5 | Just because a person did a certain action does not mean that they had to do it. | .615 | .378 |
| PAP_6 | People could have done things in the past that would have allowed them more control in the present. | .540 | .291 |
| PAP_7 | People can limit the influence of the past. | .383 | .146 |
| PAP_8 | People can choose to make a real difference because the future is not set in stone. | .658 | .433 |
| PAP_9 | There are many possible futures that people can make real through free will. | .668 | .446 |
| PAP_10 | There are different futures that people can bring about through free choice. | .709 | .503 |
| PAP_11 | What happens in the future will happen because people will choose to make it happen. | .532 | .283 |
| PAP_12 | People can choose to guide their future toward a goal. | .666 | .444 |
| PAP_13 | People can co-create the future through their free choice. | .598 | .358 |
| PAP_14 | People can freely choose how they respond to situations. | .568 | .322 |
| PAP_15 | People can choose to act one way or another way. | .656 | .430 |
| PAP_16 | People could always decide to refrain from a given action. | .586 | .343 |
| PAP_17 | Even if people cannot choose to want what they want, they can still choose how they will act. | .629 | .398 |
| PAP_18 | Free will and free choice are the same thing. | .211 | .044 |
| PAP_19 | Free will is based upon the ability to choose one path over another. | .560 | .314 |

| | | | |
|--------|--|-------------|------|
| PAP_20 | People can choose to say no to their own wants and desires. | .634 | .403 |
| PAP_21 | People can choose to deny themselves the things they want. | .596 | .355 |
| PAP_22 | Self-control is based on free will. | .439 | .193 |
| PAP_23 | Just because someone will do a certain thing does not mean that they must do it. | .683 | .466 |

Note. Extraction method was Maximum Likelihood. Items were retained if loadings and communalities were $\geq .55$ and $\geq .4$; respectively. Bold values indicate satisfactory loadings.

Table 1.3. EFA Results for Preliminary 10-Item PAP Scale (PAPS-10)

| Identifier | Item | Factor 1 | Communalities |
|------------|---|----------|---------------|
| PAP_1 | People could have made different decisions than the ones they actually made. | .702 | .492 |
| PAP_3 | People could have chosen a different path that would have led to a different present. | .637 | .406 |
| PAP_8 | People can choose to make a real difference because the future is not set in stone. | .693 | .481 |
| PAP_9 | There are many possible futures that people can make real through free will. | .651 | .424 |
| PAP_10 | There are different futures that people can bring about through free choice. | .711 | .506 |
| PAP_12 | People can choose to guide their future toward a goal. | .694 | .482 |
| PAP_15 | People can choose to act one way or another way. | .640 | .41 |
| PAP_17 | Even if people cannot choose to want what they want, they can still choose how they will act. | .645 | .416 |
| PAP_20 | People can choose to say no to their own wants and desires. | .615 | .380 |
| PAP_23 | Just because someone will do a certain thing does not mean that they must do it. | .682 | .465 |

Note. Extraction method was Maximum Likelihood with promax rotation.

Table 1.4 Factor Loadings of all FWB Items

| | Factor | | |
|--------|--------|------|------|
| | 1 | 2 | 3 |
| FAD_1 | | 0.46 | |
| FAD_2 | | 0.51 | |
| FAD_3 | | | |
| FAD_4 | | 0.65 | |
| FAD_5 | | | 0.60 |
| FAD_6 | | 0.74 | |
| FAD_7 | | | |
| PAP_1 | 0.71 | | |
| PAP_3 | 0.65 | | |
| PAP_8 | 0.76 | | |
| PAP_9 | 0.55 | | |
| PAP_10 | 0.65 | | |
| PAP_12 | 0.68 | | |
| PAP_15 | 0.56 | | |
| PAP_17 | 0.70 | | |
| PAP_20 | 0.57 | | |
| PAP_23 | 0.69 | | |

Table 1.5. Descriptives and Correlations Among Variables

| | PAPS-10 | FAD-Plus FW | LOCI | SWLS | GAD-7 | PHQ-9 |
|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | <i>M</i> = 4.85 | <i>M</i> = 4.39 | <i>M</i> = 4.64 | <i>M</i> = 3.96 | <i>M</i> = 2.73 | <i>M</i> = 2.54 |
| | <i>SD</i> = .65 | <i>SD</i> = .72 | <i>SD</i> = .69 | <i>SD</i> = .99 | <i>SD</i> = .74 | <i>SD</i> = .69 |
| PAPS-10 | - | | | | | |
| FAD-Plus FW | .568** | - | | | | |
| LOCI | .409** | .494** | - | | | |
| SWLS | .148** | .206** | .291** | - | | |
| GAD-7 | -.039 | -.057 | -.065* | -.375** | - | |
| PHQ-9 | -.073* | -.090** | -.144** | -.480** | .831** | - |
| Skewness | -.55 | -.15 | -.51 | -.35 | -.15 | .02 |
| Kurtosis | .83 | .04 | 1.22 | .06 | -.76 | -.63 |

** $p < .01$, * $p < .05$.

Table 2.1. Descriptives and Correlations Among Variables.

| | PAPS-10 | FAD-Plus FW | LOCI | SWLS | GAD-7 | PHQ-9 |
|-------------|-----------------|-----------------|-----------------|------------------|-----------------|-----------------|
| | <i>M</i> = 4.86 | <i>M</i> = 4.38 | <i>M</i> = 4.69 | <i>M</i> = 3.91 | <i>M</i> = 2.76 | <i>M</i> = 2.57 |
| | <i>SD</i> = .63 | <i>SD</i> = .77 | <i>SD</i> = .70 | <i>SD</i> = 1.02 | <i>SD</i> = .69 | <i>SD</i> = .65 |
| PAPS-10 | - | | | | | |
| FAD-Plus FW | .609** | - | | | | |
| LOCI | .464** | .486** | - | | | |
| SWLS | .130** | .186** | .234** | - | | |
| GAD-7 | -.088* | -.134** | -.124** | -.375** | - | |
| PHQ-9 | -.104** | -.154** | -.180** | -.470** | .810** | - |
| Skewness | -1.07 | -.35 | -.65 | -.37 | -.20 | -.03 |
| Kurtosis | 4.53 | .40 | 1.92 | -.26 | -.58 | -.53 |

Note. ** $p < 0.01$, * $p < .07$.

Table 2.2. EFA replication of the 10-Item PAP Scale.

| Identifier | Item | Factor 1 | Communalities |
|------------|---|----------|---------------|
| PAP_1 | People could have made different decisions than the ones they actually made. | .569 | .324 |
| PAP_3 | People could have chosen a different path that would have led to a different present. | .648 | .420 |
| PAP_8 | People can choose to make a real difference because the future is not set in stone. | .600 | .360 |
| PAP_9 | There are many possible futures that people can make real through free will. | .578 | .334 |
| PAP_10 | There are different futures that people can bring about through free choice. | .625 | .391 |
| PAP_12 | People can choose to guide their future toward a goal. | .682 | .465 |
| PAP_15 | People can choose to act one way or another way. | .664 | .441 |
| PAP_17 | Even if people cannot choose to want what they want, they can still choose how they will act. | .658 | .433 |
| PAP_20 | People can choose to say no to their own wants and desires. | .651 | .423 |
| PAP_23 | Just because someone will do a certain thing does not mean that they must do it. | .601 | .361 |

Note. Extraction method was Maximum Likelihood. Items were retained if Factor loadings $\geq .50$ and communalities $\geq .30$.

Table 2.3 Factor Loadings of all FWB Items

| | Factor | | |
|--------|--------|------|------|
| | 1 | 2 | 3 |
| FAD_1 | | 0.65 | |
| FAD_2 | | 0.54 | |
| FAD_3 | | | 0.49 |
| FAD_4 | | 0.64 | |
| FAD_5 | | | 0.45 |
| FAD_6 | | 0.69 | |
| FAD_7 | | | |
| PAP_1 | 0.64 | | |
| PAP_3 | 0.49 | | |
| PAP_8 | 0.49 | | |
| PAP_9 | 0.70 | | |
| PAP_10 | 0.59 | | |
| PAP_12 | 0.44 | | |
| PAP_15 | 0.44 | | |
| PAP_17 | 0.50 | | |
| PAP_20 | 0.72 | | |
| PAP_23 | 0.62 | | |

Table 3.1. Demographic Characteristics

| | Men | Women |
|--------|-----|-------|
| | 51% | 49% |
| White | 29% | 27% |
| Black | 7% | 6% |
| Latinx | 10% | 9% |
| Asian | 4% | 2% |
| Other | 3% | 3% |

Table 3.2 PAPS-10 Factor Loadings

| Item | λ |
|--------|-----------|
| PAP_1 | 0.888 |
| PAP_2 | 0.893 |
| PAP_3 | 0.807 |
| PAP_4 | 0.805 |
| PAP_5 | 0.915 |
| PAP_6 | 0.915 |
| PAP_7 | 0.907 |
| PAP_8 | 0.907 |
| PAP_9 | 0.77 |
| PAP_10 | 0.835 |

Note. RMSEA = .982, indicating good model fit. CFI = .91, indicating adequate fit.

Table 3.3 Descriptives and Correlations Among Primary Variables

| | PAPS-10 | Self-Mastery | Self-Control | Past Negative | Past Positive | Future | Rumination | Mindset | FAD |
|----------------------|-----------|--------------|--------------|---------------|---------------|-----------|------------|------------|-----------|
| α | .95 | .75 | .78 | .74 | .77 | .82 | .83 | .77 | .74 |
| ω | .95 | .74 | .78 | .74 | .76 | .82 | .82 | .77 | .74 |
| <i>M(SD)</i> | 4.58(.89) | 4.11(.98) | 3.80(.98) | 2.32(1.20) | 3.33(.83) | 3.92(.98) | 3.2(.88) | 3.85(1.22) | 4.45(.93) |
| <u>PAPS-10</u> | — | | | | | | | | |
| <u>Self-Mastery</u> | 0.07 | — | | | | | | | |
| <u>Self-control</u> | 0.33** | 0.58*** | — | | | | | | |
| <u>Past Negative</u> | 0.17 | 0.27** | 0.03 | — | | | | | |
| <u>Past Positive</u> | 0.27* | 0.32** | 0.07 | 0.29*** | — | | | | |
| <u>Future</u> | 0.13 | 0.4** | 0.01 | 0.41*** | 0.67*** | — | | | |
| <u>Rumination</u> | 0.43** | 0.32** | 0.17* | 0.52*** | 0.46*** | 0.18** | — | | |
| <u>Mindset</u> | 0.44** | 0.25** | 0.26* | 0.13* | 0.17* | 0.23** | 0.15** | — | |
| <u>FAD</u> | 0.68*** | 0.48*** | 0.43** | 0.03 | 0.13* | 0.24** | 0.22** | 0.43** | — |
| <u>LOC</u> | 0.47** | 0.54*** | 0.44** | 0.09 | 0.20* | 0.34** | 0.11** | 0.39** | 0.55** |

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

For LOC: $M = 4.66$, $SD = .93$, $\alpha = .86$, $\omega = .86$

Table 3.4 PAPS-10 Criterion Validity & Temporal Stability Coefficients

| | PAPS Timepoint 1 | PAP Definition | Volition Definition | PAPS Timepoint 2 |
|------------------------|---------------------|-------------------|------------------------|---------------------|
| PAPS Timepoint 1 | | | | |
| PAP Definition | 0.82*** | | | |
| Volition Definition | 0.55*** | 0.62*** | | |
| PAPS Timepoint 2 | 0.89*** | 0.80*** | 0.53*** | |

Note. *** $p < .001$

Table 4.1. Demographic Characteristics

| | Men | Women |
|--------|-----|-------|
| | 54% | 46% |
| White | 31% | 27% |
| Black | 7% | 6% |
| Latinx | 10% | 9% |
| Asian | 3% | 2% |
| Other | 3% | 2% |

Table 4.2 Correlations Among All Primary Variables

| | PAPS | MLQ | SWLS | CLAD | SAS | FAD | LOC |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| α | .92 | .88 | .89 | NA | .72 | .74 | .86 |
| ω | .92 | .88 | .89 | NA | .72 | .74 | .86 |
| <i>M(SD)</i> | 4.86(.70) | 4.15(.73) | 3.89(.90) | 3.58(.84) | 3.84(.88) | 3.67(.94) | 4.22(.98) |
| PAPS_10 | — | | | | | | |
| MLQ | 0.64*** | — | | | | | |
| SWLS | 0.53*** | 0.92*** | — | | | | |
| CLAD | 0.67*** | 0.56*** | 0.57*** | — | | | |
| SAS | 0.20*** | 0.17*** | 0.14*** | 0.18*** | — | | |
| FAD | 0.61*** | 0.50*** | 0.26*** | 0.16*** | 0.00 | — | |
| LOC | 0.43*** | 0.47*** | 0.48*** | 0.31*** | 0.05 | 0.59** | — |
| PANAS | 0.31*** | 0.58*** | 0.42*** | 0.60*** | 0.24*** | 0.23*** | 0.38** |

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.3 Indirect and Total Effects for Eudainomic Well-Being

| Path Type | Effect | <i>b</i> | <i>SE</i> | 95% C.I. | | β | <i>z</i> | <i>p</i> |
|-----------|--|----------|-----------|----------|-------|---------|----------|----------|
| | | | | Lower | Upper | | | |
| Indirect | Anti-FWB \Rightarrow Meaning \Rightarrow Satisfaction | -0.75 | 0.04 | -0.83 | -0.66 | -0.39 | -17.36 | < .001 |
| | Pro-FWB \Rightarrow Meaning \Rightarrow Satisfaction | 0.63 | 0.04 | 0.55 | 0.7 | 0.33 | 17.19 | < .001 |
| Component | Anti-FWB \Rightarrow Meaning | -0.84 | 0.04 | -0.91 | -0.77 | -0.55 | -23.9 | < .001 |
| | Meaning \Rightarrow Satisfaction | 0.89 | 0.03 | 0.83 | 0.95 | 0.72 | 29.13 | < .001 |
| | Pro-FWB \Rightarrow Meaning | 0.71 | 0.03 | 0.65 | 0.77 | 0.46 | 23.25 | < .001 |
| Direct | Anti-FWB \Rightarrow Satisfaction | -0.35 | 0.04 | -0.42 | -0.28 | -0.18 | -9.67 | < .001 |
| | Pro-FWB \Rightarrow Satisfaction | 0.24 | 0.03 | 0.17 | 0.3 | 0.12 | 7.06 | < .001 |
| Total | Anti-FWB \Rightarrow Satisfaction | -1.1 | 0.04 | -1.2 | -1.01 | -0.57 | -26.7 | < .001 |
| | Pro-FWB \Rightarrow Satisfaction | 0.86 | 0.04 | 0.78 | 0.94 | 0.45 | 21.07 | < .001 |

Note. Confidence intervals computed with 5000 parametric bootstrap samples. β = standardized effect sizes.

Table 4.3 Indirect and Total Effects for Hedonic Well-Being

| Path Type | Effect | <i>b</i> | <i>SE</i> | 95% C.I. | | β | <i>z</i> | <i>p</i> |
|-----------|---|----------|-----------|----------|-------|---------|----------|----------|
| | | | | Lower | Upper | | | |
| Indirect | Anti-FWB \Rightarrow Meaning \Rightarrow Quality | -0.12 | 0.04 | -0.19 | -0.04 | -0.12 | -3.06 | 0.002 |
| | Pro-FWB \Rightarrow Meaning \Rightarrow Quality | 0.1 | 0.03 | 0.04 | 0.16 | 0.1 | 3.09 | 0.002 |
| Component | Anti-FWB \Rightarrow Meaning | -0.84 | 0.03 | -0.91 | -0.77 | -0.55 | -23.83 | <.001 |
| | Meaning \Rightarrow Quality | 0.14 | 0.04 | 0.05 | 0.23 | 0.22 | 3.12 | 0.002 |
| Direct | Pro-FWB \Rightarrow Meaning | 0.71 | 0.03 | 0.65 | 0.76 | 0.46 | 23.85 | <.001 |
| | Anti-FWB \Rightarrow Quality | -0.27 | 0.05 | -0.36 | -0.18 | -0.28 | -5.88 | <.001 |
| Total | Pro-FWB \Rightarrow Quality | 0.26 | 0.05 | 0.17 | 0.35 | 0.27 | 5.6 | <.001 |
| | Anti-FWB \Rightarrow Quality | -0.39 | 0.03 | -0.45 | -0.32 | -0.4 | -11.45 | <.001 |
| | Pro-FWB \Rightarrow Quality | 0.36 | 0.03 | 0.3 | 0.42 | 0.4 | 10.59 | <.001 |

Note. Confidence intervals computed with 5000 parametric bootstrap samples. β = standardized effect sizes.

Appendix C: Studies 1 & 2 Materials

Subjective well-being

The Patient Depression Questionnaire (Spitzer, Kroenke, Williams & Lowe, 2001).

Over the last 2 weeks, how often have you been bothered by any of the following problems?

1. Little interest or pleasure in doing things
2. Feeling down, depressed, or hopeless
3. Trouble falling or staying asleep, or sleeping too much
4. Feeling tired or having little energy
5. Poor appetite or overeating
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down
7. Trouble concentrating on things, such as reading the newspaper or watching television
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual
9. Thoughts that you would be better off dead or of hurting yourself in some way

Response Options:

- 0 = Not at all
- 1 = Several days
- 2 = More than half the days
- 3 = Nearly every day

The Generalized Anxiety Disorder 7-item (Spitzer, Kroenke, Williams & Lowe, 2006).

Over the last 2 weeks, how often have you been bothered by any of the following problems?

1. Feeling nervous, anxious, or on edge
2. Not being able to stop or control worrying
3. Worrying too much about different things
4. Trouble relaxing
5. Being so restless that it is hard to sit still
6. Becoming easily annoyed or irritable
7. Feeling afraid, as if something awful might happen

Response Options:

- 0 = Not at all

- 1 = Several days
- 2 = More than half the days
- 3 = Nearly every day

The Satisfaction with Life Scale (Diener et al., 1985; Pavot, & Diener, 2008).

Below are five statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. In most ways my life is close to my ideal
2. The conditions of my life are excellent
3. I am satisfied with my life
4. So far, I have gotten the important things I want in life
5. If I could live my life over, I would change almost nothing

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Free Will Belief

Free Will Subscale of the FAD-Plus (Paulhus & Carey, 2011).

Below are four statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. People have complete control over the decisions they make
2. People can overcome any obstacles if they truly want to
3. People have complete free will
4. Strength of mind can always overcome the body's desires

Response Options:

- 1 = Strongly disagree

- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Initial Item Pool for Principle of Alternative Possibilities Free Will Belief.

Below is a series of statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. People could have made different decisions than the ones they actually made.
2. People's past behavior could have been different.
3. People could have chosen a different path that would have led to a different present.
4. The past is set in stone but those who built it could have done differently.
5. Just because a person did a certain action does not mean that they had to do it.
6. People could have done things in the past that would have allowed them more control in the present.
7. People can limit the influence of the past.
8. People can choose to make a real difference because the future is not set in stone.
9. There are many possible futures that people can make real through free will.
10. There are different futures that people can bring about through free choice.
11. What happens in the future will happen because people will choose to make it happen.
12. People can choose to guide their future toward a goal.
13. People can co-create the future through their free choice.
14. People can freely choose how they respond to situations.
15. People can choose to act one way or another way.
16. People could always decide to refrain from a given action.
17. Even if people cannot choose to want what they want, they can still choose how they will act.
18. Free will and free choice are the same thing.
19. Free will is based upon the ability to choose one path over another.
20. People can choose to say no to their own wants and desires.
21. People can choose to deny themselves the things they want.
22. Self-control is based on free will.
23. Just because someone will do a certain thing does not mean that they must do it.
24. *The ability to have done otherwise is needed for responsibility*
25. *A person can only be held accountable for an action if they were able to do otherwise*
26. *Human responsibility requires free choice*
27. *Every person can do good or bad—it's simply up to them*

Note. *Dropped due to expert review.

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Personal Control Beliefs

Internal Subscale of the Brief Locus of Control Scale (Lumpkin, 1988).

Below are three statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. When I make plans, I am almost certain to make them work
2. When I get what I want, it's usually because I worked hard for it
3. My life is determined by my own actions

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Appendix D: Study 3 Materials

Free Will Belief

Free Will Subscale of the FAD-Plus (Paulhus & Carey, 2011).

Below are four statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. People have complete control over the decisions they make
2. People can overcome any obstacles if they truly want to
3. People have complete free will
4. Strength of mind can always overcome the body's desires

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Principle of Alternative Possibilities Scale.

Below is a series of statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. People could have made different decisions than the ones they actually made.
2. People could have chosen a different path that would have led to a different present.
3. People can choose to make a real difference because the future is not set in stone.
4. There are many possible futures that people can make real through free will.
5. There are different futures that people can bring about through free choice.
6. People can choose to guide their future toward a goal.
7. People can choose to act one way or another way.
8. Even if people cannot choose to want what they want, they can still choose how they will act.
9. People can choose to say no to their own wants and desires.
10. Just because someone will do a certain thing does not mean that they must do it.

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

PAPS-10 Criterion Validity Assessment

People disagree over how to best define free will. Below are two common definitions of free will. Please read each definition and then indicate how much you agree with each one.

The alternative possibilities definition: A person has free will, or the capacity for free action, if they have more than one course of action that stems from the same present moment. Said differently, A person's action was free if they were able to do otherwise (that is, act in a way that was other than they did).

The volition definition: A person has free will, or the capacity for free action, if they are not externally coerced to make a particular choice and their action was an intentional one that was based on informed rational deliberation.

Personal Control Beliefs

Internal Subscale of the Brief Locus of Control Scale (Lumpkin, 1988).

Below are three statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. When I make plans, I am almost certain to make them work
2. When I get what I want, it's usually because I worked hard for it
3. My life is determined by my own actions

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Self-Mastery Scale (Pearlin & Schooler, 1978).

Below are seven statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. There is really no way I can solve some of the problems I have (RC)
2. Sometimes I feel that I'm being pushed around in life (RC)
3. I have little control over the things that happen to me (RC)
4. I can do just about anything I really set my mind to
5. I often feel helpless in dealing with the problems of life (RC)
6. What happens to me in the future mostly depends on me
7. There is little I can do to change many of the important things in my life (RC)

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

The Brief Self-Control Scale (Tangney et al., 2004).

Below are thirteen statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

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

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Temporal Perspectives and Orientations

Brief Zimbardo Time Perception Inventory (Kostal et al., 2015; Zimbardo & Boyd 1999).

Below are twelve statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. I often think of what I should have done differently in my life
2. I think about the good things that I have missed out on in my life
3. I think about the bad things that have happened to me in the past
4. Familiar childhood sights, sounds, smells often bring back a flood of wonderful memories
5. It gives me pleasure to think about my past
6. Happy memories of good times spring readily to mind
7. I often feel that I cannot fulfill my obligations to friends and authorities
8. To think about my future makes me sad
9. Usually, I do not know how I will be able to fulfill my goals in life
10. When I want to achieve something, I set goals and consider specific means for reaching those goals
11. I complete projects on time by making steady progress
12. I am able to resist temptations when I know that there is work to be done

Past-Negative subscale (items 1-3), Past-Positive subscale (items 4-6)

Future-Negative subscale (items 7-9), Future-Positive subscale (items 10-12)

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree

- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Ruminative Tendencies

The Ruminative Responses Scale (Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Nolen-Hoeksema et al., 1999).

Below is a list of 10 possible responses when people feel down, sad, or depressed. Read each possibility and indicate if you never, sometimes, often, or always think or do each one when you feel down, sad, or depressed. Please be open and honest in your responding. Whichever answers you feel best fit you are the best answers for you.

Stem: when feeling down, sad, or depressed, you...

1. Think “What am I doing to deserve this?”
2. Think “Why do I always react this way?”
3. Think about a recent situation, wishing it had gone better
4. Think “Why do I have problems other people don’t have?”
5. Think “Why can’t I handle things better?”
6. Analyze recent events to try to understand why you are depressed
7. Go away by yourself and think about why you feel this way
8. Write down what you are thinking and analyze it
9. Analyze your personality to try to understand why you are depressed
10. Go someplace alone to think about your feelings

Brooding rumination subscale (1-5), Reflection rumination subscale (6-10)

Response Options:

- 0 = Never
- 1 = Sometimes
- 2 = Often
- 3 = Always

Mindset

The 3-Item Growth Mindset Scale (Dweck, 1995, 1999, 2006).

Below are twelve statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. You can always change basic things about the kind of person you are
2. No matter what kind of person you are, you can always change substantially
3. The harder you work at something, the better you will be at it

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Personality

The Big Five Inventory-10 (BFI-10, Rammstedt, & John, 2007).

Below are 10 statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate the degree to which you feel each statement describes your personality. Please be open and honest in your responding. Whichever answers you feel best fit you are the best answers for you.

Stem: I see myself as someone who...

1. ...is reserved (RC)
2. ...is generally trusting
3. ...tends to be lazy (RC)
4. ...is relaxed, handles stress well (RC)
5. ...has few artistic interests (RC)
6. ...is outgoing, sociable
7. ...tends to find fault with others (RC)
8. ...does a thorough job
9. ...gets nervous easily
10. ...has an active imagination

Extraversion subscale: items 1, 5

Agreeableness subscale: items 2, 7

Conscientiousness subscale: items 3, 8

Neuroticism subscale: 4, 9

Openness to Experience subscale: 5, 10

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Appendix E: Study 4 Materials

Free Will Belief Manipulation

Instructions

For the first part of this study, you will be completing a measure of written expression.

For each statement given, you will be asked to rephrase the statement in your own words.

For example, take the sentence, "It rains at five every day in Florida." You could change the order the information is presented and say: "In Florida, it rains every day at five." You could substitute one of the words in the sentence and say, "It precipitates at five every day in Florida."

You could leave out some information to simplify the sentence and say, "It rains often in Florida"

Some of the statements you will be given may be complex and difficult to understand. Please think carefully about the sentence to make sure that you are accurately capturing the meaning of the sentence when you re-write it.

Each sentence will be presented for 30 seconds. During that time, please think about the meaning of the sentence and how it could apply to your life.

Pro-FWB Items

1. I demonstrate my free will every day when I make decisions
2. I take personal pride in good decisions I have made in the past because I know that, at the time, I had the freedom to and could have made a bad decision.
3. I am able to override the genetic and environmental factors that sometimes influence my behavior.
4. Avoiding temptation requires that I exert my free will.
5. Ultimately people cannot blame their own actions on anything other than themselves.
6. I have free will to control my actions and ultimately to control my destiny in life.
7. People are responsible for their behaviors because they have free will to control their actions.
8. Our actions and thoughts are not simply the result of prior experiences.
9. By exerting their free will, people can and do overcome the negative effects of a dysfunctional environment.
10. Given that I have had personal experiences that science cannot explain, I also know that I have free will even if science cannot explain it.

Anti-FWB Items

1. Ultimately, we are biological computers – designed by evolution, built through genetics, and programmed by the environment.
2. Science has demonstrated that free will is an illusion.
3. Everything a person does is a direct consequence of their environment and genetic makeup.
4. Once scientists understand enough about the physical principles underlying behavior, they should be able to precisely predict a person's future actions based solely on that person's genetics and prior experiences.
5. Our actions are determined by what we have experienced in the past combined with the specific genetic predispositions that we have.
6. Like everything else in the universe, all human actions follow from prior events and ultimately can be understood in terms of the movements of molecules.
7. A belief in free will contradicts the known fact that the universe is governed by lawful principles of science.
8. People often claim that they have free will, but all they really have is the experience of making choices.
9. Just as science has shown that physical movement is merely forces of gravity combined with muscular force, scientists are now realizing that personal thoughts, feelings, and beliefs are similarly controlled by basic physical processes.
10. Even if some behaviors are not actually pre-determined, this does not mean there is free will, as random actions are no more under our control than are those caused by prior events.

Control Items

1. Alkaline power cells generally work longer than ordinary batteries
2. Monarch butterflies fly slowly but have been sighted hundreds of miles at sea.
3. Half a day's boat ride away from Athens lies the isle of Mykonos.
4. Sugar cane and sugar beets are grown in 112 countries.
5. Many of the mountain peaks in the Rockies are over 14,000 feet high.
6. The Appalachian Highlands are worn down mountains and plateaus stretching from northern Alabama to the St. Lawrence River in Canada.
7. The greatest distance the earth is from the sun is 94,452,000 miles.
8. The Nile River in Africa is the world's largest river.
9. The Los Angeles metropolitan area is known for its complex system of highways.
10. Most appliances are guaranteed for a full year against defects.

Manipulation Checks of FWB

Free Will Subscale of the FAD-Plus (Paulhus & Carey, 2011).

Below are four statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. People have complete control over the decisions they make
2. People can overcome any obstacles if they truly want to
3. People have complete free will
4. Strength of mind can always overcome the body's desires

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Principle of Alternative Possibilities Scale.

Below is a series of statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. People could have made different decisions than the ones they actually made.
2. People could have chosen a different path that would have led to a different present.
3. People can choose to make a real difference because the future is not set in stone.
4. There are many possible futures that people can make real through free will.
5. There are different futures that people can bring about through free choice.
6. People can choose to guide their future toward a goal.
7. People can choose to act one way or another way.
8. Even if people cannot choose to want what they want, they can still choose how they will act.
9. People can choose to say no to their own wants and desires.
10. Just because someone will do a certain thing does not mean that they must do it.

Response Options:

- 1 = Strongly disagree

- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Subjective Well-Being

The Satisfaction with Life Scale (Diener et al., 1985; Pavot, & Diener, 2008).

Below are five statements that you may agree or disagree with. Using the 1 - 6 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1. In most ways my life is close to my ideal
2. The conditions of my life are excellent
3. I am satisfied with my life
4. So far I have gotten the important things I want in life
5. If I could live my life over, I would change almost nothing

Response Options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Slightly disagree
- 4 = Slightly agree
- 5 = Agree
- 6 = Strongly agree

Five Items from The State-Trait Anxiety Inventory (Spielberger et al, 1974).

A number of statements which people have used to describe themselves are given below. Please read each statement and indicate the degree to which you feel each one *right now*, that is, *at this very moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

1. I feel secure
2. I am presently worrying over possible misfortunes (RC)
3. I feel satisfied
4. I feel self-confident
5. I feel content

Response Options:

| | | | | | |
|---------------|---|---|---|---|-----------------|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Not at all | | | | | Very much so |

The Cantril Self-Anchoring Striving Scale (Cantril, 1965).

Please imagine a ladder with steps numbered from zero at the bottom to 10 at the top.

The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you.

On which step of the ladder would you say you personally feel you stand at this time?

| | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|---|---|----------------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Worst possible life for you | | | | | | | | | Best possible life for you |

Mediators/Controls

The Meaning in Life Questionnaire (Steger, Frazier, Oishi, & Kaler, 2006; Steger & Shin, 2010).

Please take a moment to think about what makes your life feel important to you. Please indicate the degree to which you feel each statement is true for you. These are also very subjective questions, so there are no right or wrong answers.

1. I understand my life's meaning
2. I am looking for something that makes my life feel meaningful
3. I am always looking to find my life's purpose
4. My life has a clear sense of purpose
5. I have a good sense of what makes my life meaningful
6. I have discovered a satisfying life purpose
7. I am always searching for something that makes my life feel significant
8. I am seeking a purpose or mission for my life
9. My life has no clear purpose (RC)
10. I am searching for meaning in my life

Presence of meaning subscale: 1, 4, 5, 6, 9

Search for meaning subscale: 2, 3, 7, 8, 10

Response Options:

- 1 = Absolutely Untrue
- 2 = Mostly Untrue
- 3 = Somewhat Untrue
- 4 = Somewhat True
- 5 = Mostly True
- 6 = Absolutely True

The Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988)

Below is a list of twenty emotionally relevant adjectives. Please indicate the degree to which you feel each one *right now*, that is, *at this very moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

1. Interested
2. Distressed
3. Excited
4. Upset
5. Strong
6. Guilty
7. Scared
8. Hostile
9. Enthusiastic
10. Proud
11. Irritable
12. Alert
13. Ashamed
14. Inspired
15. Nervous
16. Determined
17. Attentive
18. Jittery
19. Active
20. Afraid

Positive affect items: 1, 3, 5, 9, 10, 12, 14, 16, 17, 19