WHAT MAKES LIFE FEEL MEANINGFUL?

Thesis submitted by Vlad Costin to the University of Sussex for qualification of

Doctor of Philosophy in Psychology.

December 2017

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

Signature:…………………………………………………………………..

<u>University of Sussex</u>

Doctor of Philosophy in Psychology

What makes life feel meaningful?

SUMMARY

Through a series of four papers using experimental and correlational methods, this thesis investigates precursors to judging life as meaningful. This thesis extends and tests tripartite models that define meaning in life (MIL) as comprised of the three dimensions of purpose, coherence and significance, while integrating claims derived from the Meaning Maintenance Model and previous research on sources of MIL (e.g., relationships, personal control). In Paper 1, we showed that different kinds of coherence threat (self-uncertainty and general uncertainty) were perceived differently, with self-uncertainty being overall most successful at influencing felt uncertainty; however, neither of the two manipulations influenced MIL judgements. In Paper 2, against our predictions, we did not find evidence that the effects of belongingness and personal control additively increase sense of MIL. In Paper 3, across three studies, we tested whether fulfilment of the three dimensions of MIL (coherence, purpose, significance) predicts MIL judgments contemporaneously and over time. In Study 1, we improved previous measures to create distinct scales of the key constructs. In Studies 2 and 3, we showed that sense of significance was the most consistent predictor of MIL judgments across time, with the effects of purpose and coherence being moderated by religious belief (Study 3). Finally, in Paper 4, we used a multilevel approach to show that different meaning frameworks (i.e., propositions that one holds about oneself and the world; e.g., identities, values) are seen as more meaningful, the more they provide a sense of purpose, significance and coherence. This, in turn, predicted the perceived importance of meaning frameworks.

Finally, I discuss implications for the future of the construct of MIL in terms of definition, operationalisation, theoretical utility and future directions.

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ACKNOWLEDGEMENTS

life satisfaction. Both Helga and Rod have been a great source of support throughout the PhD. I am also grateful to Martha Casey and Dan Hyndman who have always responded promptly whenever I burst into their office with some urgent technical query.

I would also like to thank Laura King and her amazing lab group at University of Missouri for swapping ideas and helping me shape my ideas about meaning in life and how it can be understood as an intuitive and reflective process. She has also been a most generous host. Laura, alongside her wife, Lisa, and their D&D-playing and overall cool-guy son, Sam, have introduced me to the awesome city of Columbia, MO.

I am vastly grateful to my parents, Dana and Paul. From as early as I can remember, they have instilled the values of curiosity and inquisitiveness. Furthermore, they have been an inspiration in how they have kept being open-minded and always seeking to learn and improve themselves. They have also shown no limits to how caring and available they can make themselves whenever I needed them, no matter what hardships or difficulties they themselves were facing at the time. Moreover, without the many (not at all easy) financial sacrifices and their unwavering moral support, I would have never been in a position to do a PhD programme in the UK.

Next, I want to thank Rebecca Atkinson. She holds many accolades including "best travel and adventure companion", "most fun teaching partner", and "best boardgame buddy", to name only a few. I was so keen to run ideas by her (both PhD-related and otherwise) that the only reason I ever shut up around her was because I was just as keen to hear her insightful observations and musings. She has repeatedly proofread study materials for me, helped me recruit participants, advised me on

INTRODUCTION

When I started my PhD project, I initially set out to study the psychological functions of historical narratives, and I proposed that, alongside other psychological needs, they would fulfil a need for meaning. However, reading through the many studies that use the word "meaning", I became increasingly unsure about the theoretical boundaries of the construct. Given this definitional ambiguity, previous findings on meaning were difficult to interpret. As such, what I initially envisaged as a secondary aspect of my PhD research, quickly became its focus. The breadth and depth of questions related to meaning would have made unsatisfactory any cursory attempt at studying it. Furthermore, questions about meaning in life are at once fascinating and of ultimate personal importance for individuals ("a matter of life and death", Yalom, 1980, p. 419)

People have been preoccupied with how to live good lives long before psychology was a discipline of study. For a comparably long period of time, people have cautioned against defining a good life simply in terms of things that are immediate and pleasurable (Aristotle, c.350BCE/1962). Stories often portray their characters trying to make sense of who they are, trying to figure out why life is worth living, or what their ultimate purpose is. Herman Hesse (1922/2008) depicts Siddhartha, the eponymous protagonist of his novel, embarking on a lifelong quest to find what makes a meaningful life. Tolstoy's (1886/2010) Ivan Ilych lives a non-reflective, carefree life until awareness of his imminent death confronts him with the consequences of having lived an empty life. People also talk about engaging in meaningful life pursuits and finding fulfilment in their lives.

Despite the widespread interest, it is unclear how people appraise their lives as being more or less meaningful. Does the presence (or absence) of certain

psychological states reliably predict whether people experience their lives as meaningful (or meaningless)? In this Introduction chapter, I will review existing definitions of meaning in life and selectively discuss the most compelling accounts of what can affect one's perceptions of meaningfulness. I will highlight gaps in existing research throughout. Finally, I will describe the series of questions addressed throughout my PhD project and how they have attempted to integrate various lines of inquiry to form a more cohesive account of how people perceive meaning in life.

Defining and Measuring Meaning in Life

Before defining *meaning in life (MIL)*, I draw attention to the difference between meaning *in* life and meaning *of* life (Crescioni & Baumeister, 2013; Debats, Drost, & Hansen, 1995). The latter involves ontological assumptions about human nature and existence, i.e., that there is an underlying meaning that applies to all life. Meaning of life is a topic that has been addressed within philosophy (e.g., trying to capture aspects of life that are objectively valuable and attractive; Kant, 1790/1987). MIL, instead, is personal: rather than referring to life in general (Is life meaningful?), MIL is about an individual's life, in particular (Is *my* life meaningful?).

MIL is an abstract well-being construct (e.g., eudaimonic well-being, Ryan & Deci, 2001) that is separate from related constructs such as life satisfaction (Steger & Kashdan, 2007) and happiness (Baumeister, Vohs, Aaker & Garbinsky, 2013), but with considerable overlap (e.g., Steger, Frazier, Oishi, & Kaler, 2006). Some philosophers have argued that MIL is also linked to some objective feature of the world. For instance, Wolf (2010) defines MIL as something that is "realized by loving objects that are worthy of love" (p. 13). Similarly, Mintoff (2008) suggests that MIL is related to having connections to things that are transcendent (i.e., that are

less likely to be undercut by doubts about their arbitrariness and insignificance). For instance, engaging in political activism might be inherently more meaningful than having a beer with friends. Thus defined, MIL is a phenomenon that could be identified by external observers: if individuals are observed engaging in more objectively attractive (or transcendent) activities, then their lives will also be rated as more meaningful.

Nevertheless, it is unclear what constitutes a worthwhile endeavour. People might be prone to self-deception when assessing the objective value of their pursuits. For instance, a person could be convinced of the worth of their artistic creation, despite it having no discernible value (e.g., stylistically flawed, unappreciated or unknown by others; Koethe, 2010). This person would supposedly perceive their life as meaningful. It remains unclear whether such a life would be qualitatively different from that of a person who genuinely produces something of value. Furthermore, when talking about self-deception, the implication is that there is a *true* objective criterion of value, regardless of one's appraisal. Wolf (2010) admits that her examples of worthwhile pursuits are based on US middle-class values. This suggests that any candidates for objective criteria would be heavily socially and culturally prescribed. In this case, the objective component of MIL would become a measure of how much activities that one enjoys are congruent with those sanctioned by the cultural context in which an individual finds oneself. These issues have prompted some to question whether a meaningful life is anything other than the individual *perceiving* their life as meaningful (e.g., Haidt, 2010).

Most psychology research on MIL has avoided this philosophical debate by only capturing the subjective component of MIL through self-report measures. These measures have participants project their own notions of MIL when responding to

items such as "I have a good sense of what makes my life meaningful" (Meaning in Life Questionnaire – Presence subscale, MLQ-P; Steger et al., 2006). The subjective appraisals of MIL, as captured by self-report measures, will be henceforth referred to as *MIL judgments* or *sense of MIL* (e.g., George & Park, 2016a). Regardless of whether MIL judgments can be equated to MIL, *feeling* that life is meaningful should be at least partially indicative of how meaningful life is (Heintzelman & King, 2015). Moreover, others have argued that MIL judgments are beneficial in their own right (Hicks & King, 2009a).

Most studies that have looked at positive life outcomes within the meaning literature have used MIL judgments. As such, sense of MIL has been associated with higher life satisfaction and lower depression scores (Steger et al., 2006; Zika & Chamberlain, 1992). During adolescence, MIL judgments have been associated with lower binge drinking, drug use, and unsafe sex, as well as increased physical exercise and healthy eating (Brassai, Piko & Steger, 2011). Moreover, associations between MIL judgments and health benefits were present even one year after the initial measurement, while also controlling for prior health, values, and other well-being scores (Brassai, Piko, & Steger, 2015).

Nevertheless, self-reported measures of MIL have been criticised on several accounts. Firstly, early measures of sense of MIL such as the Life Regard Index (LRI; Battista & Almond, 1973) and the Purpose in Life Index (PIL; Crumbaugh & Maholick, 1964) have been confounded with some of their predicted correlates, such as positive and negative affect, and life satisfaction (Mascaro, Rosen & Morey, 2004; Schnell, 2009; Steger et al., 2006; Zika & Chamberlain, 1992). While these issues have been addressed by more recent measures (Steger et al., 2006), many questionnaires use items related to purpose ("My personal existence is: (1) utterly

meaningless, without purpose, (5) purposeful and meaningful"; Crumbaugh &

Maholick, 1964) and coherence ("Do you have the feeling that you are in an

unfamiliar situation and don't know what to do?"; Antonovsky, 1987). As I will

discuss later, coherence and purpose are constructs related to MIL, but these should

be distinguished from more global MIL judgments (for differences between sense of

purpose and MIL judgments, see George & Park, 2013). In this sense, measures such

as the Perceived Personal Meaning Scale (PPMS; Wong, 1998; e.g., to what extent

do you "feel your life as a whole has meaning") are more appropriate to measure

MIL judgments in isolation (George & Park, 2013). Finally, sense of MIL ratings

have been influenced by theoretically unrelated factors such as mood (Hicks & King,

2009b; King, Hicks, Krull, & Del Gaiso, 2006), and socially desirable responding

(Ebersole & Quiring, 1989). However, the latter association is similar to that

between social desirability and other well-being measures (Heintzelman, Trent, &

King, 2015), and is even sometimes absent (e.g., Steger et al., 2006).

Predictors of MIL Judgments

Studies using open-ended questions have identified several potential sources

of MIL (e.g., Wong, 1998; Delle Fave, Brdar, Wissing, & Vella-Brodrick, 2013;

Schnell, 2009; for a summary of sources identified across several research

programmes see Schnell, 2011, p. 669). Within these studies, participants' responses

are organised into categories such as religion, community, family, self-growth, and

autonomy. Moreover, in experimental studies, various factors have been shown to

influence MIL judgments, such as regularities in one's environment (Heintzelman,

Trent, & King, 2013), counterfactual thinking (Kray et al., 2010; Seto, Hicks, Davis,

& Smallman, 2015) and knowledge about one's perceived "true self" (Schlegel,

Hicks, King, & Arndt, 2011). Apart from these few experimental studies, most of the

research in this area is correlational or qualitative. As such, the direction of causation is mainly inferred theoretically, as opposed to demonstrated empirically. In what follows, I discuss three of the most well-researched, or theoretically-promising predictors of MIL judgments: relationships to others, personal control and self-esteem.

Relationships to others. "Hell is other people" is Sartre's often cited line from the play "No Exit" (Sartre, 1944/1989) and is almost just as frequently misunderstood to mean that relationships with others are undesirable, negative. In fact, Sartre, by his own statements (see Grippe, 2012), meant to underline the importance of others in that we define ourselves through the means that others provide. Quite different from a message of alienation, Sartre stresses the importance that our relations play in making sense of ourselves and our existence. Jovchelovitch (2007) explains that the world cannot be represented in isolation: as the child is vulnerable at birth, it is dependent on another. Winnicott (1960) famously remarked, there is no such thing as just a baby, instead there is always a baby and its caregiver. Moscovici (1984) described his construct of social representations as a means of "making something familiar, or unfamiliarity itself, familiar" (p. 37), but as the "social" in the name suggests, they are necessarily constructed in acts of communication with others

In the past 50 years of meaning research, social relationships emerge as "the most consistent and compelling source of meaning" (O'Donnell et al., 2014, p. 45). In their review, O'Donnell and colleagues focus on three important types of relationships: family, romantic and friendship. In urban samples from seven countries, across 3 continents (Australia, Africa and Europe), 83.9% of participants mentioned family as a source of meaning in life (Delle Fave et al., 2013). In a study

of young adults in the United States, 68% of participants picked family or a specific family member (e.g., mother) as "one thing that makes life most meaningful for you", and the second most frequent contributor was friends, with 14% (Lambert et al., 2010, Study 1). Finally, relationships emerge as associated with MIL even when using non-verbal methods (Steger et al., 2013). Participants were asked to "take photos of the things that make your life feel meaningful" (p. 534), as well as to describe the pictures and explain what they meant. Over 89% percent of the submitted pictures (and their corresponding descriptions) were placed by independent coders under one of the 5 sub-categories of the "relationships" main category: family, friends, romantic partners, child, co-workers.

Conversely, when people are systematically deprived of healthy relationships they report lower levels of meaning. Both being a victim and being a perpetrator of bullying correlated negatively with sense of MIL (Henry et al., 2013). Furthermore, those who are faced with the loss of an important other, sometimes report experiencing "meaning crises" (Lichtenthal, Currier, & Keesee, 2013; Wheeler, 2001).

Relationships that induce a sense of belonging have been shown to have the most positive impact on sense of MIL (Lambert et al., 2013). Belonging is a universal human need (Baumeister and Leary, 1995) and has been defined as "a secure sense of fitting in" (Lambert et al., 2013, p. 1418). Previous studies have shown that identities that engendered a sense of belonging provided a sense of MIL both correlationally and prospectively (Vignoles, Regalia, Manzi, Golledge, & Scabini, 2006). Moreover, in experimental studies, participants who were asked to reflect on belongingness reported a higher sense of MIL than those who reflected on social support or on being valued by others (Lambert et al., 2013; Study 3).

Personal control. Sense of personal control can be defined as "the person's belief that he or she is capable of obtaining desired outcomes, avoiding undesired outcomes, and achieving goals" (Landau, Kay, & Whitson, 2015, p. 695). Defined in this broad way, the notion of personal control subsumes subtly different constructs such as efficacy (Bandura, 1977) and locus of control (Rotter, 1966). Critically, control and sense-making or coherence (discussed later in relation to MIL) are related. For instance, participants who received feedback that was non-contingent on actual performance (lack of control) scored higher on need for structure (Whitson & Galinsky, 2008). In the same paper, participants who received the random feedback on a task (lack of control) were more likely to identify an image within a grainy picture when no such image existed. These findings suggest that people can compensate for a personal control threat by bolstering their sense of coherence.

More direct evidence for the link between personal control and MIL judgments comes from research on the related construct of free will. Believing in free will is broadly defined as the belief that one can freely decide and act (but the specifics of this definition are still debated; see Shepard & Reuter, 2012). Free will belief is positively correlated with sense of MIL (Baumeister & Brewer, 2012; Bergner & Ramon, 2013; Crescioni, Baumeister, Ainsworth, Ent, & Lambert, 2015). Finally, the related constructs of autonomy (i.e., a desire to "self-organise experience and behaviour"; Deci & Ryan, 2000, p. 231) and competence (similar to having a sense of efficacy) have been linked to eudaimonic well-being which has been conceptually related to MIL (Ryan & Deci, 2001). These constructs, alongside relatedness, have also been shown to predict higher sense of MIL three days later (Martela, Ryan, & Steger, 2017).

Self-esteem. People are driven by a universal need to self-enhance (e.g., Sedikides, Gaertner, & Toguchi, 2003; Seidkides & Strube, 1997; Taylor & Brown, 1988) which is related to seeing oneself more positively, i.e., having high self-esteem (Rosenberg, 1965). High self-esteem has been consistently associated with high sense of MIL (e.g., Steger et al., 2006). Moreover, sense of MIL has been shown to mediate the relationship between religiosity and self-esteem, accounting for as much as 76% of the shared variance between these two constructs (Steger & Frazier, 2005). Additionally, aspects of one's identity that are seen as most central and which also fulfil self-esteem needs predict sense of MIL (Vignoles et al., 2006). Moreover, mortality salience was found to decrease people's perceptions of MIL but only for participants low in self-esteem (Routledge et al., 2010). This would suggest that self-esteem has a protective role for MIL judgments.

Meaning in Life as Coherence, Purpose and Significance

Gradually, researchers have converged on the idea that MIL is comprised of three definitional components: *coherence* (or comprehension), *purpose* and *significanc*e (George & Park, 2016a; King et al., 2006; Martela & Steger, 2016; Steger et al., 2006). These accounts have been referred to as *tripartite models of MIL* (George & Park, 2016a; Martela & Steger, 2016), and this dimensionality has also been reflected in recent definitions of MIL:

> "Meaning is the web of connections, understandings, and interpretations that help us comprehend our experience and formulate plans directing our energies to the achievement of our desired future. Meaning provides us with the sense that our lives matter, that they make sense, and that they are more than the sum of our seconds, days, and years." (Steger, 2012a, p. 165).

If coherence, purpose and significance are facets of MIL, then these would be expected to relate to MIL judgments: *feeling* that life makes sense, has purpose and is worthwhile should make one *feel* that life is more meaningful. The three dimensions positively predicted MIL judgments, accounting for more than 60% of variation in sense of MIL on two different self-report measures (George & Park, 2016b). Moreover, each dimension of MIL correlated with MIL judgments while controlling for the effect of the other two dimensions, suggesting that coherence, purpose and significance each have unique predictive ability. This suggests that MIL dimensions may operate as more proximal predictors of MIL judgments than the ones previously discussed. Proximal predictors explain more variation in MIL judgments, and they may explain a large portion of the variance previously accounted by the more distal predictors. Nevertheless, the dimensions of MIL have not been shown to be distinct from other conceptually-related predictors of MIL (e.g. significance and global self-esteem). Moreover, if MIL judgments are formed on the basis of sense of coherence, significance and purpose, that implies a causal direction from dimensions to sense of MIL which had not be tested by previous correlational designs.

Below, I describe each of the three dimensions of MIL in turn, with the aim of defining each construct and establishing its conceptual boundaries. Furthermore, I explain the emergence of each construct in relation to MIL and MIL judgments, and flag potential gaps and areas for further investigation.

Coherence. Coherence is understood as making sense of one's experiences or the world more broadly (Heintzelman & King, 2014a). As described earlier, researchers have previously included items related to coherence or comprehension within self-report measures of MIL (e.g., "I understand my life's meaning", MLQ-P;

Steger et al., 2006). Indeed, meaning and coherence have been sometimes conflated.

Inspired by the work of Kierkegaard (1846/1997) and Heidegger (1953/1996)

psychologists have talked about absence of meaning in terms of any "awareness of

nonrelations" (see Proulx & Heine, 2010). Similarly, Nagel (1971) has talked about

the absurd and meaninglessness as a consequence of individuals seeing systems of

justifications about themselves as arbitrary. In contrast, perceiving regularities in

one's environment has been associated with sense of MIL (Heintzelman et al., 2013),

and some have even suggested that MIL judgments are about coherence

(Heintzelman & King, 2014a). Nevertheless, coherence is a broad construct and it is

necessary to understand what kind of coherence (e.g., self-related versus world-

related) is most relevant to MIL judgments

One influential account has suggested that people do not differentiate

between the content of different kinds of incongruities (e.g., self-related versus

world-related inconsistency) when reacting to any form of consistency-threatening

information (Proulx & Inzlicht, 2012). Within the Meaning Maintenance Model

(MMM; Heine, Proulx, & Vohs, 2006), people's responses to various forms of threat

have been interpreted as an effort to restore "meaning" (used here to denote

consistency or coherence). The MMM describes a regulatory model where meaning-

making is a process that aims to return an individual to a "normal state" in response

to incoherence. Meaning-making can be achieved by participants deploying several

strategies. Using Piaget's (1929/2011) terminology, people can either *accommodate*

or *assimilate* in response to anomalous stimuli (Proulx & Heine, 2010b; Proulx &

Inzlicht, 2012). Accommodating involves restructuring one's challenged views of

the world to fit the novel stimulus, whereas assimilation involves warping the

dissonant stimulus to fit one's views. Assimilation involves distortion and might not

be an ideal strategy, whereas accommodation involves more cognitive resources and is time-consuming. Alternatively, people can cope with the coherence threat by affirming their commitment to an unrelated domain. Affirmation has been previously proposed as a coping strategy within other theories of threat compensation (e.g., Hogg, 2000; Steele, 1988).

Affirmation effects have been demonstrated with a diversity of stimuli. When people read an absurd parable by Franz Kafka that defied narrative conventions (compared to a classic parable), participants more strongly identified with their ingroup (Proulx et al., 2010). Even trivial violation-of-expectation manipulations such as doing a task with reverse-coloured playing cards (where spades would be red, and hearts would be black) led people to compensate by showing stronger support for social inequality if that was congruent with their original beliefs (Proulx & Major, 2013). Moreover, studies employing different uncertainty manipulations seem to produce comparable compensatory effects (McGregor, Zanna, Holmes, & Spencer, 2001; McGregor, Prentice, & Nash, 2009).

Nevertheless, while these studies suggest that people have a pervasive need for coherence, these stimuli might also elicit unique, content-specific effects. For instance, research has shown that, when they are given the option, people will respond in ways that directly address the specific threat they have experienced (Knowles, Lucas, Molden, Gardner, & Dean, 2010; Shepherd, Kay, Landau, & Keefer, 2011). Critically, these stimuli might influence different kinds of perceptions of coherence. Meaning-threat studies have not usually included state measures of the coherence-related experience being manipulated (e.g., uncertainty). Even in the few studies where these have been measured and reported, there is no direct comparison of the elicited psychological experience by different stimuli.

When studying sense of coherence, I suggest that there is an important distinction between coherence about the world, and coherence about oneself and events in one's lives (life story coherence, e.g., Bluck & Habermas, 2000; self-continuity, e.g., Vignoles, 2011) . In general, self-relevant information has been shown to be preferentially processed (e.g., Bargh, 1982). For instance, sense of MIL is important for identity construction, alongside self-continuity and other identity motives (e.g., Vignoles et al., 2006). Finally, MIL is about "my life", so coherence, as a component of MIL, should have a similar personal focus.

Purpose. Similar to coherence, purpose has also been used interchangeably with MIL (e.g., Ryff, 1989). More recently, purpose has been seen increasingly as a separate but related concept to MIL (George & Park, 2013; Kashdan, Rottenberg, Goodman, Disabato, & Begovic, 2015; McKnight & Kashdan, 2009). This is supported by a recent study which identified different correlates for sense of MIL and sense of purpose, despite the two being highly correlated (r = .61; George & Park, 2013). MIL judgments (captured using the PPMS; Wong, 1998) were positively associated with religion and spirituality, when controlling for sense of purpose (as measured by the Purpose subscale of the Ryff Psychological Well-being Scale; Ryff, 1989). While controlling for MIL judgments, sense of purpose was positively correlated with optimism and negatively correlated with pessimism, stressful life experiences and goal violations. Both sense of MIL and sense of purpose were positively correlated with positive affect and life satisfaction, and showed an inverse correlation with negative affect.

Purpose has been defined in relation to goals and behaviour, and presented as a motivational component of MIL (Martela & Steger, 2016). For instance, purpose is "a central, self-organizing life aim that organises and stimulates goals, [and]

manages behaviours" (McKnight & Kashdan, 2009), and the accompanying feeling

is a "sense of intentionality and goal-directedness" (Boyle et al., 2009, p. 574).

Unlike goals, purposes do not require an outcome to be obtained. Instead, purpose

acts as a "supraordinate goal manager" (McKnight & Kashdan, 2009, p. 243) that,

once a goal is fulfilled, stimulates the generation of other goals consistent with each

other. Purpose can be seen as predominantly prescriptive and future-oriented,

creating a vision of how life *should* be.

Significance. Significance is a construct that has received comparatively less

empirical attention, compared to purpose and coherence (but see previous work on

related constructs such as the "valued life" dimension; Morgan & Farsides, 2009).

Nevertheless, within philosophy, the connection between MIL and the, arguably

equivalent, idea of "having a worthwhile life" has often been debated (for a

theoretical separation see Metz, 2012). Significance (or "existential mattering";

George & Park, 2014) has been defined as the extent to which individuals consider

that life matters and is worth living. Despite the vastness of the Universe, the

shortness of human life, as well as the likely future destruction of our planet, our

solar system and, ultimately, the Universe, people draw symbolic value from various

elements in their lives (religion, close others etc.) which gives them a sense of

significance.

Significance is an evaluative construct (Martela & Steger, 2016), similar to

self-esteem, but defined more broadly as a "global evaluation from a spiritual or

existential level" of one's life (George & Park, 2014, p. 47). For this reason, much of

the evidence that links significance to MIL is the same as that which links self-

esteem to MIL. Indeed, research needs to demonstrate that sense of significance is a

distinct experience from sense of self-esteem, and that the former is a stronger predictor of MIL judgments.

Meaning Frameworks

The term "meaning" has also been used in the context of *meaning frameworks* (see also *meaning systems,* MacKenzie & Baumeister, 2014). The term has been most widely used within the MMM literature (described earlier) and "meaning", in this context, again refers to sense-making (Heine et al., 2006). Meaning frameworks can refer both to simple propositions about things in the world (e.g., a chair is a piece of furniture) as well as to complex clusters of propositions (e.g., religious belief; George & Park, 2016a). Meaning frameworks have been also referred to as mental representations (Proulx & Heine, 2010a), and are seen as akin to existing constructs in psychology such as *schemata* (see Proulx & Inzlicht, 2012).

Meaning frameworks have been mainly conceptualised as structures that serve a need for coherence (e.g., Heine et al., 2006; Proulx & Inzlicht, 2012), but some have suggested that meaning frameworks contribute to all three dimensions of MIL (George & Park, 2016a). For instance, attitudes can be seen as meaning frameworks that perform evaluative functions ("attitudes refer to general evaluations", Petty & Briñol, 2010, p. 217), and values as prescriptive or proscriptive constructs (Koltko-Rivera, 2004), which would correspond to the functions of significance and purpose, respectively (see Martela & Steger, 2016). Meaning frameworks may be differentially related to each of the three dimensions of MIL (George & Park, 2016a), and these variations might explain why some frameworks contribute more to a sense of MIL than others. This is an under-researched area, particularly given the difficulty of operationalising people's

meaning frameworks. Below, I discuss some features of meaning frameworks that are relevant to modelling their relation to MIL

Meaning frameworks vary in complexity, with more complex ones expected to better satisfy sense of coherence, purpose and significance, and, in turn lead to higher sense of MIL. For instance, simple mental representations of things in the world such as expectations that coffee is similar to tea, but dissimilar to battery acid would not make one feel that life is particularly meaningful (but, as previously discussed, violating this expectation might undermine a sense of coherence derived from assumptions of an orderly environment). In contrast, more complex meaning frameworks such as *worldviews* (i.e., "beliefs regarding the underlying nature of reality, 'proper' social relations or guidelines for living, or the existence or nonexistence of important entities"; Koltko-Rivera, 2004, p. 5), would occupy a superordinate position in information processing. Similarly, identities are psychological structures that encompass a diverse range of self-related information (both personal and social; Vignoles, in press.). Therefore, complex meaning frameworks would influence more aspects of one's life and have a more pervasive influence on MIL and MIL-related constructs.

In addition to complexity, the content of meaning frameworks is important. For instance, holding a British national identity will afford different inter-related sets of associations about the world and oneself (e.g., ingroups and outgroups) compared to having a Romanian national identity. This example also helps to illustrate how meaning framework content is culturally prescribed. Simplified, narrativized versions of history (i.e., myths) are grounded in institutions and subject to change as a consequence of shifting power-relations (Bell, 2003). These myths bind people, who are otherwise unknown to each other, under a common national identity.

However, I recognise that there is also a lot of variability in how individuals within a culture internalise or resist cultural norms (e.g., Eid & Diener, 2001). Nevertheless, meaning frameworks are thus contrasted with the previously discussed sources of MIL judgments. I consider the distal (e.g., belongingness) and proximal (e.g., purpose) sources of MIL judgments to be universal, with the conditions under which they are fulfilled being dependent on cultural and individual factors (for a similar account in the context of identity see Vignoles, 2011).

Religion. Finally, meaning frameworks derived from religious belief might be particularly important for MIL. Conceptually, similar to MIL, religion is about matters of "ultimate concern" (Tillich, 1951; see also Yalom, 1980). Religious belief has been, unsurprisingly, linked to sense of MIL at the individual level (e.g. Dezutter, Soenens & Hutsebaut. 2006; Martos, Thege & Steger, 2010) and at nation-level (Oishi & Diener, 2014).

Religion also seems to relate positively to all of the previously identified sources of MIL. Individuals who thought about lacking personal control expressed heightened belief in a controlling God, when they are (Kay et al., 2008). Religious attendance was associated with increased self-esteem among those who were faced with the sudden death of a close other (Sherkat & Reed, 1992). Moreover, despite the image of the spiritual recluse who finds enlightenment in solitude, religion might be particularly effective at engendering meaningfulness because it binds people into "moral communities" (Graham & Haidt, 2010). Religion provides one with a "sacred purpose" (Newton & McIntosh, 2013) that might in turn create a sense of significance through suggestions of self-transcendence and unions with higher powers (Emmons, 2005). Religious belief is uniquely placed to satisfy the need for coherence as it is particularly resistant to evidence that would refute its existential

assumptions (see Ysseldyk, Matheson, & Anisman, 2010). Furthermore, affluent countries are linked to increased disbelief in God, and this has been attributed to the uncertainty-reducing features of more developed countries (e.g., having food security; Barber, 2011).

Overview of the Studies

In the above review, I have described how various psychological constructs and processes could contribute to the subjective experience of meaningfulness. Throughout the literature review, I have shown that the meaning literature is fragmented, with some areas of research largely avoiding measuring subjective MIL entirely (e.g., the MMM), and others (e.g., tripartite models) not explaining how newly suggested predictors of sense of MIL would coexist with previously identified ones. This PhD project attempts an integrative approach where several factors are manipulated or measured alongside each other to determine non-redundant bases of making MIL judgments. Nevertheless, capturing fluctuations in sense of MIL is particularly challenging due to a) the nature of the MIL construct, e.g., stable across time (Steger & Kashdan, 2007), and b) difficulties in measuring MIL judgments, e.g., contaminated by constructs such as positive affect (King et al., 2006), difficulty capturing low sense of MIL (Heintzelman & King, 2014b). For this reason, Papers 1 and 2 are experimental, whereas, in Paper 3 a mix of cross-sectional and longitudinal designs is used. Finally, Paper 4 captured within-person variation in sense of MIL derived from each person's meaning frameworks.

In describing the work performed as part of the empirical papers of this thesis project, I use the term "we". This is to reflect the fact that the empirical work presented has been a collaborative endeavour between my supervisor, Vivian

Vignoles, and me. Otherwise, when describing the thesis project as a whole, I use the term "I", as these observations predominantly reflect my personal interpretations.

In Paper 1, we investigated whether need for coherence was domain-specific by looking at felt uncertainty in response to two types of uncertainty manipulations. We predicted that participants who completed a task meant to induce self-uncertainty would report higher felt uncertainty about the self compared to those who completed a task meant to induce general uncertainty. We also controlled for the moderating effect of implicit and explicit self-esteem, and we predicted that self-esteem would more strongly moderate the relationships for self-uncertainty as they are both self-related processes. Findings mostly supported these predictions, showing that self-uncertainty induced felt uncertainty about the self but not felt general uncertainty. This pattern of findings suggests that processes that undermine coherence are not entirely equivalent. The study also included a measure of self-reported MIL, but this was, unexpectedly, not influenced by either of the uncertainty manipulations.

In Paper 2, we focused specifically on experimentally inducing fluctuations in MIL judgments. We aimed to test whether participants draw information from MIL-related constructs to form MIL judgments in an additive manner, i.e., fulfilling several sources of MIL as opposed to just one would result in higher sense of MIL. Alternatively, sources of MIL could be substitutable, i.e., all sources of MIL perform a similar function (e.g., need for coherence), so the fulfilment of several sources of MIL compared to the fulfilment of just one source would not show a larger increase in sense of MIL. The study had a two by two design where we sequentially manipulated belongingness and personal control. Belongingness had been previously shown to successfully induce higher scores on MIL measures (e.g., Lambert et al.,

2013) and we aimed to replicate those findings. In contrast, personal control had not been shown directly to influence MIL judgments. We captured baseline scores of sense of MIL a week before participants were invited to complete the main part of the task in the lab. Outcome variables were computed as sense of MIL change (difference between post-manipulation scores and baseline scores). Neither of the two manipulations, nor their interaction significantly influenced changes in MIL judgments. Similar non-significant effects were found for change score of sense of purpose (included for exploratory reasons).

In Paper 3, we moved away from experimental designs to focus on modelling fluctuations in MIL judgments over time, using newly developed measures that distinctly captured MIL judgments and appraisals of each of the three dimensions of MIL. Paper 3 comprised three studies. In Study 1, using a sample of participants recruited on social media, we adapted and improved previous scales of MIL judgments, sense of coherence, sense of purpose, and sense of significance, by adding reverse-phrased items and controlling for acquiescent response style. Furthermore, we showed that these are distinct constructs from more distal, theoretically-related predictors of MIL: belongingness, self-esteem, personal control and self-efficacy. In Studies 2 and 3, we used longitudinal designs with three and two time points, respectively, to test whether sense of coherence, sense of purpose, and sense of significance would predict MIL judgments one month later. Across both studies, sense of significance significantly predicted MIL judgments, but purpose and coherence did not. In Study 3, religion moderated the relationship between purpose and MIL judgments, and coherence and MIL judgments. Religious people relied on coherence, but not purpose, to make MIL judgments. Non-religious people relied on purpose, but not coherence. Consciously reflecting on one's global sense

that life has value seems to be a part of judging one's life as meaningful. This raises questions about whether MIL judgments tend to preferentially capture reflective psychological phenomena (i.e., deliberate, effortful processes), but not MIL-related feelings that are more intuitive (i.e., sense of coherence).

Unlike previous papers where we modelled differences between individuals on how they make MIL judgments, in Paper 4, we modelled within-individual differences in MIL judgments, using participants' meaning frameworks as the main unit of analysis. We aimed to extend findings from Paper 3 by showing that meaning frameworks do not only serve a coherence function in relation to MIL judgments, but they also provide a sense of purpose and significance. We sought to capture complex meaning frameworks that varied in type (beliefs, values, identities and attitudes) and content (participants' specific stances). Participants selected (or formulated) meaning frameworks in relation to 12 domains: national identity, religious identity, role identities in relation to two important others, family identity, socioeconomic beliefs, free will/determinism beliefs, beliefs about human nature, abortion attitudes, death penalty attitudes, personal values and moral foundations. Participants then rated each of their meaning frameworks on the target measures. We found that meaning frameworks that satisfied a sense of purpose, significance, and to a lesser extent, coherence, were also rated as providing a higher sense of MIL. In turn, sense of MIL predicted how important a meaning framework was. Furthermore, we were able to explore how individuals differ in what meaning frameworks they perceive as being more meaningful than others by creating individual-level moderating variables from participants' meaning framework content (e.g., religious versus atheist versus agnostic). This is the first study to systematically explore the MIL-satisfying

function of meaning frameworks, with insight into how this cannot be reduced to coherence, and implications for how people would defend when these are threatened.

In the final chapter of the thesis, I summarise the main findings and discuss their implications for the study of MIL in terms of definition and operationalisation, limitations and future directions (e.g., cross-cultural research), as well as potential applications for the present findings.

PAPER 1: Different uncertainties: Uniquely inducing uncertainty about the self

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Reference:

Costin, V., & Vignoles, V. L. (2017). *Different uncertainties: Uniquely inducing uncertainty about the self.* Manuscript in preparation.

Abstract

Uncertainty has been operationalised as both a threat to the self and a more general threat, but these two types of threat might not be interchangeable. We predicted that felt uncertainty about the self would be influenced by a self-uncertainty induction more than by a general uncertainty manipulation. We also predicted that self-esteem would elicit stronger reactions to self-relevant uncertainty. Results using data collected from 341 students indicated that the two uncertainty primes were not equivalent. Only self-relevant uncertainty increased perceptions of self-uncertainty compared to both the baseline and its corresponding control. Moreover, this effect was moderated by self-esteem whereas the general uncertainty effects were not. These findings suggest that uncertainty regarding the self is experienced differently from general uncertainty.

Introduction

"[…] the absurdity of our situation derives not from a collision between our expectations and the world, but from a collision within ourselves." (Nagel, 1971, p. 722)

Uncertainty is inherently disquieting; it defies the expectation that the world is orderly, and that one can anticipate and react appropriately to events. In response to uncertainty-provoking situations, assimilating the dissonant information into one's meaning framework provides an imperfect integration, warping the dissonant stimulus to fit pre-existing schemata (Heine et al., 2006; Proulx & Heine, 2010; Proulx & Inzlicht, 2012). Similarly, accommodating one's meaning framework to fit new information can be too cognitively demanding and time-consuming. As an alternative, people can cope with the threat by affirming a different meaning framework than the one threatened. For instance, under conditions of uncertainty, people tend to become more convinced about their positions in relation to important social issues such as abortion and capital punishment (McGregor, Zanna, Holmes, & Spencer, 2001), more sensitive to issues of fairness (Van den Bos, 2001), more likely to see their possessions as self-expressive (Morrison & Johnson, 2011), and more likely to identify with groups that are more distinctive and have more clearly-defined boundaries (e.g., Hogg, Sherman, Dierselhuis, Maitner, & Moffitt, 2007). These responses have been termed "compensatory convictions" (e.g., McGregor et al., 2001)

Across these studies, uncertainty has been operationalised differently. For instance, participants have been asked to think and write about an unresolved personal dilemma, think and write about what happens to their body when they die and the emotions that elicits (McGregor et al., 2001, Study 1), read and summarise a

difficult statistics text (McGregor & Jordan, 2007), or think about important aspects of their lives that make them feel uncertain about themselves (Hogg et al., 2007; Sherman, Hogg, & Maitner, 2009). Employing different uncertainty manipulations seems to produce comparable compensatory effects (McGregor et al., 2001; McGregor et al., 2009; but see Rios, Wheeler, & Miller, 2012). Nevertheless, assuming that, for instance, uncertainty about worldviews, uncertainty about one's identity and uncertainty about objects in one's environment are equivalent might gloss over important differences in how these are experienced by people. Different forms of uncertainty might affect one's well-being in unique ways and implicate different domain-specific compensatory mechanisms (e.g., Knowles et al., 2010).

Different Types of Uncertainty

Van den Bos (2009) defines personal uncertainty as a "subjective sense of doubt or instability in self-views, worldviews, or the interrelation between the two" (Van den Bos & Lind, 2009, p. 124). This definition of personal uncertainty would equally encompass uncertainty about the world and uncertainty about who one is. Some researchers have focused on uncertainty as specifically related to identity processes (henceforth called *self- uncertainty*). For instance, uncertainty-identity theory (e.g., Hogg et al., 2007) focuses on "uncertainty about or relating to who one is and how one should behave". Evidence suggests that, in response to uncertainty, people identify with groups that have a clearly defined structure (e.g., Hogg et al, 2007), as well as seek more extreme groups and adopt more extreme attitudes (see Hogg & Adelman, 2013).

In contrast, other research strands (e.g., McGregor et al., 2001), despite theoretically positioning personal uncertainty alongside other self-relevant constructs such as self-concept clarity (J. D. Campbell, 1990), do not specifically operationalise

it as an identity process. Particularly, in one manipulation task participants reflect on a personal dilemma in their lives, and evaluate potential consequences associated with it and their chance of occurring (McGregor et al., 2001; McGregor & Marigold, 2003), focusing on contingencies and the likelihood of events happening in one's life (henceforth called *general uncertainty*) rather than uncertainty regarding the self.

It is difficult to say whether participants experience the aversive states induced by self-uncertainty and general uncertainty manipulations as equivalent. Psychological state measures are rarely included (or reported) in uncertainty studies. When such measures are included, these are phrased differently across studies. Self-uncertainty inductions have been paired with corresponding measures of felt uncertainty about the self (e.g., Sherman, Hogg, & Maitner, 2009), whereas general uncertainty inductions were paired with corresponding state measure such as felt general uncertainty (e.g., McGregor et al., 2001). State uncertainty is particularly difficult to measure as individuals might be unable or unwilling to evaluate their levels of uncertainty (Van den Bos, 2009). Nevertheless, self-report measures may give more insight into one's underlying psychological states in response to uncertainty, compared to simply recording one's defensive responses.

The Moderating Effect of Delay

Initially rooted in mortality salience research (Greenberg, Arndt, Simon, Pyszczynski, & Solomon, 1994), it was suggested that people would at first inhibit uncertainty-related thoughts in response to an uncertainty prime and that meaning maintenance processes would become activated after a short delay (Proulx et al., 2010). Indeed, participants were shown to have lower accessibility of uncertainty-related thoughts if this was measured immediately after the manipulation, i.e., no delay (Wichman, Brunner, & Weary, 2008; Study 2). However, in some studies, the

dependent variable is measured "immediately" after the manipulation and it still captures the expected effect (e.g., Hogg et al., 2007; Sherman et al., 2009). As such, delay potentially moderates uncertainty effects but this should be further explored with different types of uncertainty.

The Moderating Effect of Implicit and Explicit Self-esteem

Traditionally, self-esteem has been operationalised as self-reported positive self-views (e.g., Rosenberg, 1965), but such overt measures of self-esteem (henceforth called *explicit self-esteem;* ESE), might obscure self-related views at a less conscious level (*implicit self-esteem;* ISE; Farnham, Greenwald, & Banaji, 1999). A combination of high ESE and low ISE characterises *defensive self-esteem* (Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003; also called *unstable* or *fragile self-esteem*; Kernis, 2005; Kernis, Lakey, & Heppner, 2008). While self-esteem generally serves an ego protective function in response to threatening stimuli (Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004; Taylor & Brown, 1988), those who have high ESE but low ISE tend to process self-relevant information in a defensive manner (e.g., boasting in response to a good performance; Kernis, Greenier, Herlocker, Abend, & Whisenhunt, 1997). The suggested explanation is that truly adaptive self-esteem is when ESE and ISE are both high, so that the person's sense of self-worth is stable and does not need constant reinforcing.

When faced with uncertainty, those who had low ISE and high ESE formed stronger compensatory convictions in response to an uncertainty threat (McGregor & Marigold, 2003; Study 3; McGregor, Nail, Marigold, & Kang, 2005). It is unclear how defensive individuals would rate state uncertainty. They might a) report high scores of state uncertainty to reflect their heightened sensitivity to threatening information, or b) defensively under-report how uncertain they feel.

Current Study

The current study aimed to address this issue by comparing two manipulations of uncertainty: a) self-uncertainty (e.g., Hogg et al., 2007; Sherman et al., 2009) and b) general uncertainty (e.g., McGregor & Marigold, 2003; McGregor et al., 2001). Our main dependent variables were a measure of felt uncertainty about the self and a measure of felt general uncertainty, which have been used previously in conjunction with the self-uncertainty and the general uncertainty induction, respectively.

We predicted that both uncertainty manipulation types (*self* and *general*) would predict higher felt uncertainty scores. However, we predicted that those in the self-uncertainty condition would report higher levels of felt uncertainty about the self compared to those in the general uncertainty condition. This would be expected if there are specific forms of uncertainty (e.g., about the self) which are perceived as such, rather than diffusely, as a generic uncertainty feeling.

Then, we tested whether the effects of the two induction procedures are affected by whether an outcome is presented immediately after the manipulation or with a short delay. For this purpose, we also included a measure of uncertainty-accessibility to test whether participants who had no delay would inhibit uncertainty-related thoughts.

Furthermore, we tested the moderating effects of ISE and ESE. Firstly, we predicted that overall, independent of manipulation condition, those with high ESE will report being less uncertain: either earnestly, benefiting from the protective effects of genuinely holding positive self-views (high ISE), or by defensively under-reporting how uncertain they feel (low ISE). For the moderation effect, we predicted a four-way uncertainty condition x manipulation type x ISE x ESE interaction. We

expected that those with low ISE and high ESE (i.e., defensive self-esteem) will have the strongest response to our uncertainty manipulation (either highest uncertainty or lowest uncertainty). Critically, we predict that the moderating effects of defensive self-esteem will be most pronounced for self-uncertainty predicting felt uncertainty about the self as they are both self-related processes. This pattern would strengthen the interpretation that not all uncertainty is equal and that people are affected differently by specific forms of uncertainty.

Finally, inconsistent experiences can have a substantial negative impact on well-being; for instance, appraising a traumatic event as violating one's beliefs or goals is associated with more post-traumatic stress disorder symptoms (Park, Mills, & Edmondson, 2012). Moreover, trivial anomalies may be similar to inconsistencies triggered by powerful life events in that they both produce aversive arousal (Proulx, Inzlicht, & Harmon-Jones, 2012). Furthermore, uncertainty has been conceptualised as a threat to one's sense of meaning (Proulx & Heine, 2012), but previous studies looking at compensatory convictions have not included a measure of perceived meaningfulness. As such, for exploratory purposes, we included a measure of meaning in life, expecting it to be negatively influenced by both of the uncertainty inductions.

Method

Participants and Procedure

The study had a 5 x 2 (uncertainty condition x delay condition), between-participants design with felt uncertainty about the self, felt general uncertainty, uncertainty accessibility, and state meaningfulness as outcome variables.

We collected data using an online questionnaire advertised as being about "preferences, personality traits and feelings". Participants first completed the ISE

and ESE measures. Then, participants were asked to complete either the general

uncertainty manipulation, its corresponding control task, the self-uncertainty

manipulation, its corresponding control task, or a neutral condition where they would

not be presented with any task (baseline condition). Afterwards, half of the

participants across all conditions were asked to complete a short questionnaire that

acted as a delay before completing the outcome measures. The other half were

presented with the dependent variables immediately after the manipulation.

Participants were semi-randomly allocated across conditions through Qualtrics (the

option was selected to randomly allocate while ensuring even numbers). Uncertainty

accessibility was the first outcome measure that participants were asked to complete.

The other three outcome variables (felt uncertainty about the self, felt general

uncertainty, and state meaningfulness) were presented afterwards to participants, in a

random order.

We recruited 341 students who participated in exchange for course credits, as

well as volunteers from student societies. Of these, 15 participants were excluded for

not responding to any of our outcome measures. The final sample consisted of 326

participants (267 females, 81.9 %; 51 males, 15.6% and 8 who did not specify),

mostly first and second year Psychology students ($N = 290$; 89.5%). Their age

ranged from 18 to 44 years ($M = 20.15$, $SD = 3.19$). Most participants were non-

religious ($N = 232$, 71.2%), followed by Christians ($N = 63$, 19.3%) with the

remaining participants coming from a mix of religious backgrounds.

Materials

The questionnaire (see Appendix 1) was created and distributed online

through the survey software, Qualtrics (https://www.qualtrics.com/).

ISE and ESE. We measured ISE using the single-item measure: "How much do you like your name, in total" (Gebauer, Riketta, Broemer, & Maio, 2008). In order to avoid suspicion as to the true purpose of the experiment, this item was embedded among similarly-phrased filler items (e.g., "How much do you like your course, in total?"). All responses were given on a 9-point scale (1 = *Not at all*; 9 = *Very much*). Similarly, ESE was measured using the Single Item Self-Esteem (SISE) measure ("I have high self-esteem"; Robins, Hendin, & Trzesniewski, 2001), embedded among items from the Ten Item Personality Inventory (TIPI, Gosling, Rentfrow, & Swann, 2003; e.g. "I am extraverted, enthusiastic"). Responses were again given on a 9-point scale (1 = *Does not apply at all*; 9 = *Applies completely*). Both of these short measures have been used separately in uncertainty studies (e.g. Rios et al., 2012), as well as in conjunction with each other to capture defensive self-esteem (Haddock & Gebauer, 2011).

General uncertainty manipulation. For inducing general uncertainty, we used the "personal dilemma" task (McGregor, Haji, & Kang, 2008; McGregor & Marigold, 2003; McGregor et al., 2001). Participants are asked to think about an unresolved dilemma in their lives about which they are "not yet sure whether to take action or just leave things as they are". After naming the dilemma, they commented on a) the value of taking action and b) the value of changing the way things are. Participants then had to list both the immediate and long-term consequences associated with each of these approaches and the estimated likelihood of these consequences' occurrence (in percentages). The associated control condition asked about a *friend's dilemma* and participants answered the subsequent questions accordingly.

Self-uncertainty manipulation. The self-uncertainty induction asked participants to list three aspects of their lives that they feel most *uncertain* about (Hogg et al., 2007; Sherman et al., 2009). Participants then have three text boxes in which to list the three separate aspects. The corresponding control condition was identical with the key difference that participants had to list aspects of their lives they felt most *certain* about.

Delay. We used the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) for the delay manipulation. This measure has been previously used as a filler task between the uncertainty manipulation and a number of outcome variables (e.g., McGregor et al., 2001; van den Bos, 2001; van den Bos, Ameijde, Gorp, & Russell, 2006; van den Bos, Euwema, Poortvliet, & Maas, 2007).

Uncertainty accessibility. Adapting an existing uncertainty-accessibility measure (Smith, James, Varnum & Oyserman, 2014), we created 25 word stems, of which 6 could be completed either with neutral words or with uncertainty-related words: "DO_ _ _" ("doors" vs. *"doubt"*), "SH_ _Y" ("shady" vs. *"shaky"*), "MU_ _" ("must" vs. *"mull"*), "T_ _N" ("teen" vs. *"torn"*), "_NS_RE" ("insure" vs. *"unsure"*), R_ _ _LESS ("ruthless" vs. *"restless"*). Uncertainty-accessibility was calculated as the total number of uncertainty-related words that people generated (scores ranged from 0 to 6).

Felt general uncertainty. Felt general uncertainty was measured by asking people to rate the extent to which they experienced each of 19 feelings related to personal uncertainty (e.g. "confused", "of two minds", "torn"; McGregor et al., 2001). Participants responded using a 5-point scale (1 = *Very slightly or not at all*; 5 = *Very much*). Responses on all 19 words were averaged to form a scale of *felt uncertainty* and the scale showed excellent internal reliability (Cronbach's α = .95).

Felt uncertainty about the self. Additionally, participants were asked "Overall, how uncertain/certain do you feel about yourself?" with responses on a 9-point scale (1 = *Very uncertain*; 9 = *Very certain*) (Grant & Hogg, 2012; Hogg, Meehan, & Farquharson, 2010; Sherman et al., 2009).

State meaningfulness. We used a measure adapted from the Meaning in Life Questionnaire, Presence subscale (MLQ-P; Steger et al., 2006), where participants were asked "Right now, how much do you feel..." followed by 8 items related to meaning in life (4 were reverse-phrased), e.g. "...you understand your life's meaning". Responses were given on a 5-point scale (1= *Not at all*, 5 = *Entirely*)[1]. Items showed good internal reliability and were averaged to form a measure of meaning in life (Cronbach's α = .73).

Results

Preliminary Analyses

A series of tests was run to ensure that participants were indeed randomly distributed across conditions. A one-way, between-participants ANOVA with ten levels corresponding to our 5 x 2 design revealed no significant differences in the age of our participants across groups, $F(9, 308) = .91$, $p = .521$, $\eta_p^2 = .026$. Similarly, we found no significant differences between conditions on ESE, $F(9, 316) = 1.28$, $p = .248$, $\eta^2 = .035$, or ISE scores, $F(9, 316) = 1.13$, $p = .343$, $\eta_p^2 = .031$. For the categorical demographic variables in our data, Chi-square tests of association were run with gender, $\chi^2(9) = 10.22$, $p = .333$, period of time lived in the UK ("always lived in the UK" or "other"), $\chi^2(9) = 3.89$, $p = .919$, course studied ("Psychology" or

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[1] This was included as part of a larger battery of items capturing six identity motives (Motivated Identity Construction Theory, Vignoles, 2011), based on the personal identity motive scale (W. E. Thomas et al., 2017). These items were included for scale validation purposes, and may be reported elsewhere.

"Not Psychology"), and religious belief ("Non-religious" vs. "Religious"), $\chi^2(9) =$ 8.52, $p = .483$. All were non-significant suggesting that the randomisation was successful.

Main Analysis

In our main analysis, we sequentially tested the moderating effect of delay, followed by the moderating effect of having defensive self-esteem. These moderators were run in separate analyses, as our sample size did not support studying 5-way interaction effects.

We first tested whether having a delay after our manipulations would affect uncertainty-related outcomes. We ran a three-way ANOVA with uncertainty condition (control vs. uncertainty) by manipulation type (general vs. self) by delay condition (no delay vs delay) on uncertainty accessibility. We found no significant main effects or interaction effects, Fs(1, 248) = .02 – 3.26, $p = .072$ -.879. However, as people had very low scores on the uncertainty accessibility measure (Ms = .88 – 1.12, SDs = .63 - .93), we were concerned about floor effects. Consequently, we ran a three-way MANOVA with the two main uncertainty outcomes (felt uncertainty about the self and felt general uncertainty), but this also showed no significant main effects or interaction effects, Fs(2, 247) = .50 – 2.20, $p = .113$ -.856. Therefore, we concluded that delay did not inhibit uncertainty-related thoughts and we did not include it as a moderator in further analyses. Descriptive statistics across our outcome variables for each of the five manipulation conditions are shown in Table 1.1.

Table 1.1. Means (standard deviations) for felt uncertainty about the self, felt general uncertainty, and perceived meaningfulness across conditions

	Self-uncertainty (N = 67)	General uncertainty (N = 62)	Self-related control (N = 68)	General control (N = 61)	Baseline (N = 68)
Felt uncertainty about the self	4.82 (2.08)	4.34 (1.81)	4.19 (1.99)	4.44 (1.90)	4.13 (1.81)
Felt general uncertainty	2.19 (.86)	2.35 (.82)	2.28 (.93)	2.19 (.79)	2.06 (.76)
Perceived meaningfulness	3.41 (.88)	3.41 (.84)	3.40 (.84)	3.27 (.81)	3.50 (.79)

Then, we ran a two-way MANCOVA with uncertainty condition (control vs. uncertainty) by manipulation type (general vs. self-related) on felt general uncertainty and felt uncertainty about the self. ISE and ESE were included in the model as covariates, alongside all interaction terms. As suggested by Aiken and West (1991), continuous variables (i.e., ISE and ESE) were centred at their respective means.

Looking at the covariates, there was a significant multivariate effect of ESE, $F(2, 239) = 31.40$, $p < .001$, $\eta_p^2 = .208$, with separate univariate analyses showing that higher self-esteem was associated with lower felt general uncertainty, $F(1, 240) = 28.34$, $p < .001$, $\eta_p^2 = .106$, $r = -.24$, and with lower felt uncertainty about the self, $F(1, 240) = 49.43$, $p < .001$, $\eta_p^2 = .171$, $r = -.38$. This effect was qualified by a significant multivariate interaction between ESE and ISE, $F(2, 239) = 4.03$, $p = .019$, $\eta_p^2 = .106$, with separate univariate analyses showing that the ESE and ISE interaction was not significantly associated with felt uncertainty about the self, $F(1, 240) = .04$, $p = .846$, $\eta_p^2 < .001$, but it was significantly associated with felt general uncertainty, $F(1, 240) = 7.30$, $p = .007$, $\eta_p^2 = .030$. However, as shown in Figure 1.1, ISE did not significantly predict felt general uncertainty for low levels of ESE (-1 SD), $b = .03$, $p = .653$, with 95% bias-corrected adjusted confidence intervals (BCa CI), between -.10 and .16, nor for high levels of ESE (+1SD), $b = -.15$, $p = .090$, 95% BCa CI [-.13, .12].
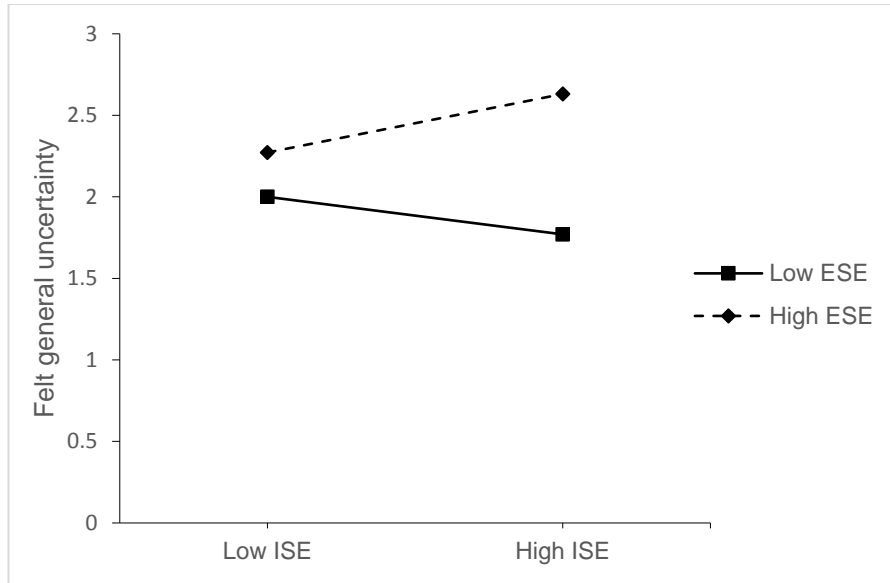
Figure 1.1. Simple slopes for the interaction effects of ESE and ISE on felt general uncertainty

Looking at our main predictor variables, there were no significant multivariate main effects of uncertainty condition, $F(2, 239) = 1.68$, $p = .189$, $\eta_p^2 = .014$, or manipulation type, $F(2, 239) = .23$, $p = .798$, $\eta_p^2 = .002$. However, the key multivariate interaction of uncertainty condition and manipulation type was significant, $F(2, 239) = 4.54$, $p = .012$, $\eta_p^2 = .037$. Corresponding univariate analyses, indicated that the interaction effect was not significant for felt general uncertainty, $F(2, 239) = .86$, $p = .356$, $\eta_p^2 = .004$. Instead, the effect was only significant for felt uncertainty about the self, $F(2, 239) = 6.53$, $p = .011$, $\eta_p^2 = .026$. As shown in Figure 1.2, for the general manipulation, being in the control or uncertainty condition had no significant effect on felt uncertainty about the self, $b = .22$, $p = .486$, 95% BCa CI [-.43, .81]. However, for the "self" manipulation, those in the uncertainty condition

reported more felt uncertainty about the self, than those in the control condition, $b =$ -1.01, $p = .003$, 95% BCa CI [-1.70, -.22].
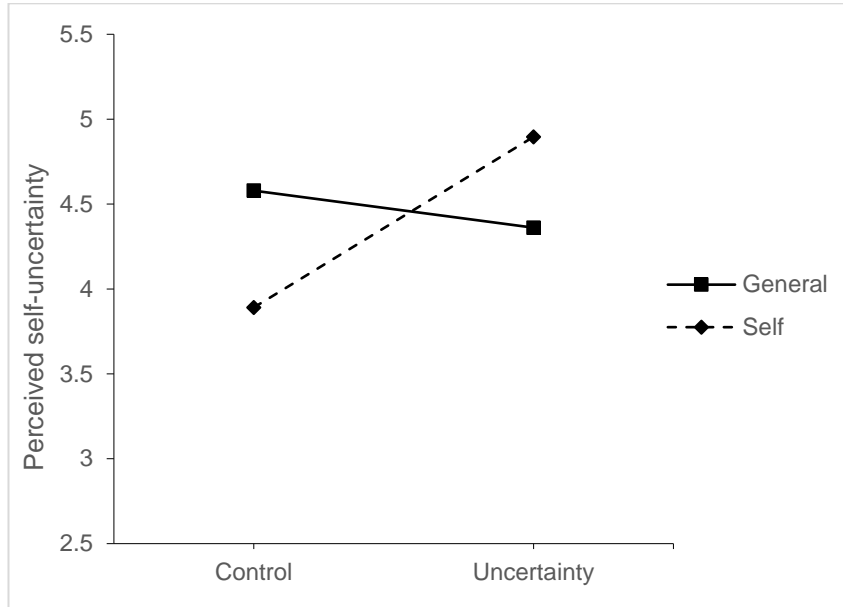
Figure 1.2. Felt uncertainty about the self for uncertainty condition by manipulation type.

Finally, the predicted four-way interaction showed marginal multivariate significance, $F(2, 239) = 2.89$, $p = .059$, $\eta_p^2 = .023$. Corresponding univariate analyses showed that, for felt general uncertainty, the interaction term was not significant, $F(1, 240) = .41$, $p = .525$, $\eta_p^2 = .002$, but it was significant for felt uncertainty about the self, $F(1, 240) = 4.33$, $p = .038$, $\eta_p^2 = .018$. In unpacking this interaction (see Figure 1.3), we found that for those with low ESE and low ISE, low ISE and high ESE, or high ISE and high ESE, there was no significant effect of manipulation type, Fs(1, 240) = .46 - 1.52, $p = .218 - .492$, $\eta_p^2 = .002 - .006$, uncertainty condition, Fs(1, 240) = .57 - 1.17, $p = .282 - .419$, $\eta_p^2 = .002 - .005$, or their interaction, Fs(1, 240) = .56 - 2.00, $p = .158 - .454$, $\eta_p^2 = .002 - .008$. However, for high ISE and low ESE , while there was no effect of manipulation type, $F(1, 240) = .061$, $p = .806$, $\eta_p^2 < .001$, or uncertainty condition, $F(1, 240) = .525$, $p = .469$, η_p^2

= .002, their interaction was significant, $F(1, 240) = 5.68$, $p = .018$, $\eta_p^2 = .023$. For the general manipulation, those exposed to the uncertainty condition did not significantly differ from those exposed to the control, $b = 1.03$, $p = .169$, 95% BCa CI [.17, -.38]. In contrast, for the self manipulation, those in the uncertainty condition reported higher levels of felt uncertainty about the self than their control condition counterparts, $b = -2.05$, $p = .042$, 95% BCa CI [-.58, 2.64].

We also compared the two uncertainty-inducing conditions to the baseline condition, while controlling for ISE, ESE and their interactions on felt general uncertainty and felt uncertainty about the self. The effect of condition was significant, $F(2, 184) = 3.36$, $p = .037$, $\eta_p^2 = .035$, with the self-uncertainty manipulation ($M = 4.85$, $SE = .22$) significantly increasing felt uncertainty about the self compared to baseline ($M = 4.06$, $SE = .22$), $t = -.79$, $p = .032$, 95% BCa CI [.05, 1.53], but with no other significant differences.

Finally, we looked at MIL judgments as the dependent variable, with manipulation type by uncertainty condition. First, we ran the moderation model with the delay manipulation in an ANCOVA. This yielded no significant main effects or interactions, Fs(1, 245) = .02 – 1.71, ps = .192 -.889. Then, we ran an ANCOVA with for ISE and ESE as moderators. This yielded a significant positive main effect of ESE, $F(1, 237) = 48.77$, $p < .001$, $\eta_p^2 = .171$. No other effects were significant, Fs(1, 237) = .00 – 3.35, ps = .069 -.989.
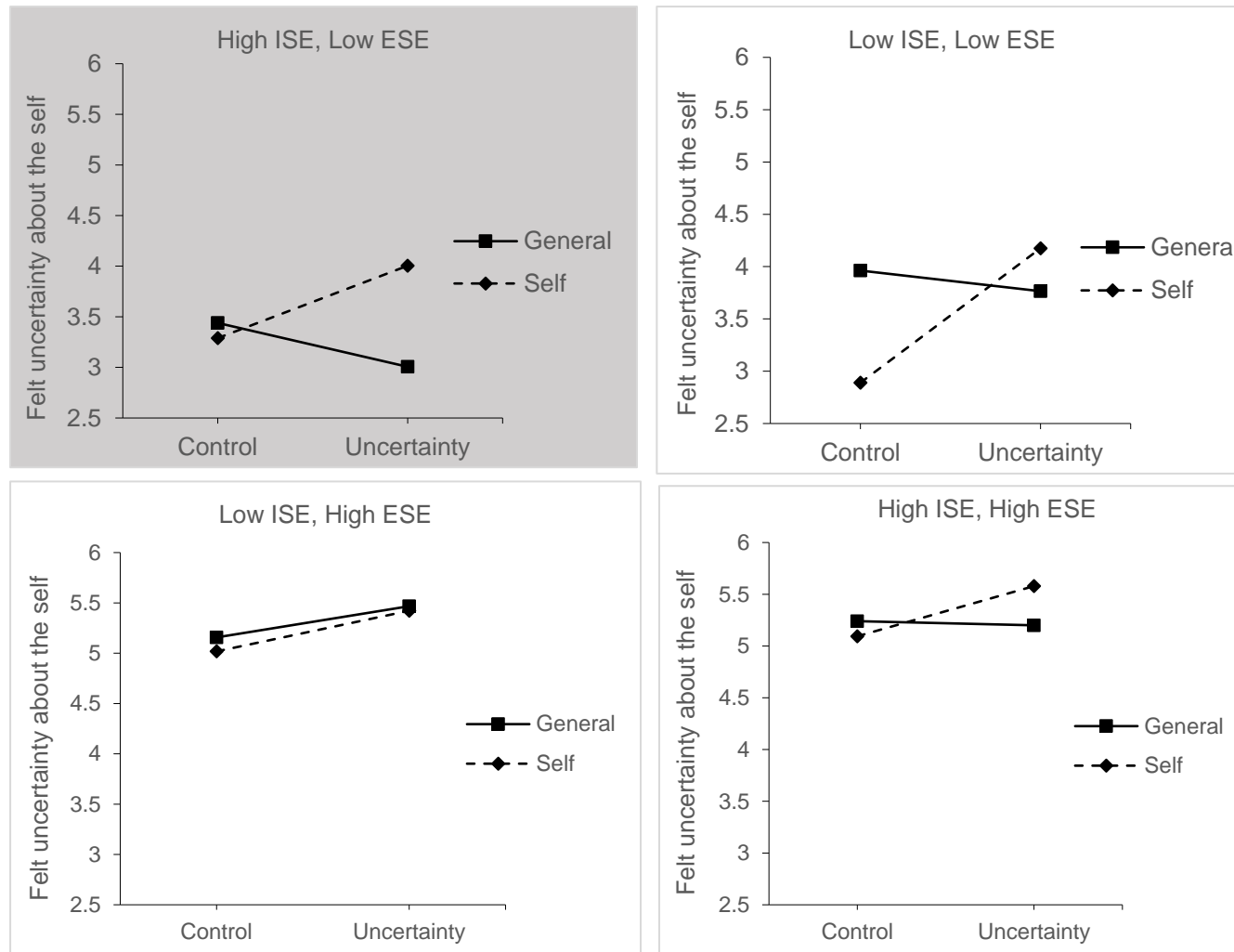
Figure 1.3. Felt uncertainty about the self for uncertainty condition by manipulation type by ISE by ESE. Note. Greyed out panel represents a significant interaction

Discussion

Interpreting the Findings

This study aimed to tease apart the effects of general uncertainty from those of self-uncertainty. Self-uncertainty led to higher felt uncertainty about the self when compared to either an empty control condition, or a self-certainty condition. Furthermore, self-uncertainty had no effect on felt general uncertainty which would suggest that effects were specific to the self rather than related to general uncertainty. Supporting this interpretation, ISE and ESE, as well as manipulation type, moderated the effect of uncertainty on felt uncertainty about the self. Specifically, those who had high ISE, but low ESE reacted more strongly to the manipulation by reporting higher felt uncertainty about the self, but only when exposed to the self-uncertainty induction. This does not replicate previous findings that show low ISE – high ESE individuals reacting more strongly to uncertainty (e.g., McGregor et al., 2005; Rios et al., 2012). Nevertheless, an interaction with ISE and ESE that was exclusive to the self-related uncertainty processes supports our prediction that there are specific self-related uncertainty effects.

In contrast, there were no effects of the general uncertainty induction on either of the two types of uncertainty measures. This finding contradicts previous research that shows the general manipulation influencing felt general uncertainty (e.g., McGregor et al., 2001). Given that the measure of felt uncertainty was influenced by other factors in line with predictions (e.g., ESE, and ISE and ESE interaction), this seemed to have worked as intended. Then, it is possible that the general uncertainty induction failed to elicit feelings of uncertainty. Delay did not moderate the effect of manipulations on any uncertainty measure, suggesting that the current results cannot be readily explained in terms of uncertainty inhibition.

Nevertheless, completing the PANAS might not have created a sufficiently long delay (other studies used longer delays; e.g., Hogg et al., 2010). As such, if the general uncertainty induction was more threatening than the self-uncertainty inductions, then participants might have self-affirmed by inflating their responses on both the felt uncertainty about the self, and the felt general uncertainty measures.

It is also worth noting the difference in corresponding control conditions for the two types of manipulations. While the self manipulation had a self-certainty inducing control condition, the general manipulation asked participants to think about an unresolved dilemma in a friend's life. The latter is arguably neutral at best and uncertainty-inducing at worst, perhaps obscuring the effect of the corresponding uncertainty condition. Nevertheless, even when compared to the baseline condition, general uncertainty did not significantly influence any uncertainty judgment. Moreover, the difference in control conditions would not explain why self-uncertainty influenced felt uncertainty about the self but not felt general uncertainty.

Finally, neither of the two uncertainty manipulations decreased perceptions of subjective meaning in life. This would seem to contradict the suggestion that uncertainty of any kind threatens one's sense of meaning (see Meaning Maintenance Model; MMM; Heine et al., 2006; Proulx & Inzlicht, 2012). However, measures of perceived meaningfulness have been shown to be consistently high (Heintzelman & King, 2014a) and stable across time (Steger & Kashdan, 2007). Consequently, given that our manipulations only induced slightly above average ratings of perceived uncertainty, it is doubtful whether such small fluctuations would make people more likely to agree with statements such as "[…] your life is meaningless". Our findings suggest that self-reported meaningfulness ratings would not vary with trivial inconsistencies as is predicted by the MMM.

Despite not capturing experiences associated with general uncertainty, we have shown that the self- uncertainty manipulation uniquely influenced felt uncertainty about the self, while also being singularly moderated by self-related processes (e.g., ISE and ESE). These findings suggest that self-uncertainty might be experienced differently than more general feelings of uncertainty.

Implications and Concluding Remarks

Even if the two uncertainty manipulation procedures are experienced differently, the two types of uncertainty are expected to lead people to form similar compensatory affirmations (Heine et al., 2006; Proulx & Heine, 2010; Proulx, 2012). A next step is to directly compare the compensatory reactions they elicit. If one form of uncertainty threatens the self, while others do not, then self-uncertainty manipulations would lead to identity-related affirmations (e.g., Rios et al., 2012) as opposed to simply shifting focus to beliefs about the world that are not under threat (e.g., Kay, Gaucher, McGregor, & Nash, 2010).

To the extent that people are motivated to maintain a sense of coherence and structure, it is important to understand how people experience their disruption. If one feels uncertain about circumstances in one's life (e.g., moving home, career change), then this experience could be very different from feeling uncertain about aspects related to one's identity.

PAPER 2: Belonging and personal control as sources of meaning in life

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Reference:

Costin, V., & Vignoles, V. L. (2017). *Belonging and personal control as sources of meaning in life.* Manuscript in preparation.

Abstract

To understand whether factors that influence judgments about meaning in life (MIL) and purpose exert their effects additively or in a substitutable manner, we used two theoretically-distinct MIL-relevant experiences: sense of belonging and sense of personal control. In a 2x2 between participant design, 112 students were induced to feel low/high belongingness and low/high control by writing two essays. Outcome variables were measures of MIL and purpose in life change (computed by subtracting scores obtained from participants one week prior to the main experiment from scores given after the manipulation). We predicted that participants in the low belonging-low control condition would report the most negative MIL and purpose in life change. In contrast, those in the high belonging – high control would display levels of MIL and purpose change that were either a) positive and highest (additive account) or b) similar to those in the two mixed conditions (e.g. low belonging- high control). However, we found no significant main or interaction effects of our manipulations on MIL or purpose change scores, preventing us from distinguishing between an additive or substitutable explanation. Results are discussed in terms of the limitations of using MIL judgments to measure MIL fluctuations.

Introduction

Reflecting concerns traditionally studied by philosophers (e.g., Aristotle, c.350BCE/1962; Camus, 1942/1955), the concept of meaning in life (MIL) has also inspired fruitful research programmes within psychology. Subjectively judging one's life as meaningful (for a broader discussion on subjective meaningfulness see Paper 3 and Paper 4) has been shown to be both desirable (Steger, Kashdan, Sullivan, & Lorentz, 2008) and linked to positive mental and physical health outcomes (Bower, Kemeny, Taylor, & Fahey, 1998; Brassai et al., 2011; Brassai et al., 2015; Reker, Peacock, & Wong, 1987;; Zika & Chamberlain, 1992). Given the recognised benefits of having a meaningful life, many studies have looked at potential precursors. Across different research programmes, a large number of sources of meaningfulness have been suggested, such as regularities in one's environment (Heintzelman et al., 2013), connection to nature (Howell, Passmore, & Buro, 2013), gratitude and grit (Kleiman, Adams, Kashdan, & Riskind, 2013), and knowledge about one's perceived "true self" (Schlegel et al., 2011). Nevertheless, some of these factors might overlap and be redundant with one another, or they might capture constructs at different levels of abstraction. It is unclear whether non-overlapping factors have an interchangeable effect on feelings of MIL or whether their effects are additive.

The current study aims to investigate how two proposed sources of sense of MIL, belongingness and control, interact to influence perceptions of meaningfulness. We chose belongingness as relationships are considered "the most consistent and compelling source of meaning" (O'Donnell et al., 2014, p. 45), and Schnell (2011) identified interpersonal relationships as a common source of MIL across several research programmes. In contrast, personal control is a less researched source of MIL, but is theoretically interesting, given its link to models of eudaimonic well-

being (Deci & Ryan, 2000). Moreover, personal control would have minimal overlap with belongingness, in contrast to other factors such as self-esteem (Leary, 2005) .

Social Relationships and MIL

Being socially integrated is highly desirable and provides wide-ranging benefits (e.g., being a valued member of an ingroup; Correll & Park, 2005), such that it is unsurprising that positive relationships are associated with higher MIL. When asked to express freely what gives them MIL, participants consistently select family or friends as one of the most important sources (Delle Fave et al., 2013; Lambert et al., 2010). Also, when asked to submit pictures of what makes their life meaningful, 89% of participants submitted a picture that was classed as pertaining to "relationships" (Steger et al., 2013). Moreover, in a two-wave longitudinal study, Krause (2007) found evidence that social support positively predicted MIL judgments. Similarly, being deprived of healthy relationships has a negative impact on perceived meaningfulness. Both being a victim and being a perpetrator of bullying correlated negatively with MIL scores (Henry et al., 2013). Additionally, when faced with the loss of an important other, people seem to suffer "meaning crises" (e.g., Lichtenthal et al., 2013; Wheeler, 2001).

It has been suggested that relationships that give a sense of belonging (i.e., "a secure sense of fitting in", Lambert et al., 2013, p. 1418) are most relevant to MIL. Belonging and MIL, as motivational constructs underlying identity construction, have been shown to correlate with one another (Vignoles et al., 2006). In a series of experimental findings, those who were exposed to a belonging manipulation came to judge their lives as more meaningful compared to those in a social support condition or a social worth condition (Lambert et al., 2013).

Personal Control and MIL

Previous empirical and theoretical work has linked control-related constructs to MIL. Broadly defined, personal control is "the person's belief that he or she is capable of obtaining desired outcomes, avoiding undesired outcomes, and achieving goals" (Landau, Kay, & Whitson, 2015, p. 695) and subsumes related constructs such as self-efficacy (Bandura, 1977) and locus of control (Rotter, 1966). Within Self-Determination Theory (Deci & Ryan, 2000), the related construct of autonomy (i.e., "the organismic desire to self-organize experience and behavior"; Deci & Ryan, 2000, p. 231) has been related to eudaimonic well-being (i.e., wellness obtained through self-actualization rather than through subjective happiness; Ryan & Deci, 2001). Moreover, autonomy predicted higher MIL scores three days later (Martela et al., 2017). Similarly, having a sense of control in one's most important role (e.g., father, spouse) was related to self-reported MIL and purpose in life ratings (Krause & Shaw, 2003). Furthermore, the related experience of having free will beliefs (see Nichols, 2004) has been positively associated with MIL scores (Bergner & Ramon, 2013; Crescioni, Baumeister, Ainsworth, Ent, & Lambert, 2015). Finally, Baumeister (1991) includes self-efficacy as a central MIL need, sometimes used interchangeably with the notion of personal control (e.g. Sommer, Baumeister & Tillman, 2012).

Sources of MIL Interchangeable Versus Additive

Despite the wealth of research on sources of MIL, it is unclear whether an individual judges the meaningfulness of their life by whatever source of MIL is salient (sources are substitutable) or whether one integrates information across several relevant sources (sources are additive). In support of substitutability, studies have shown that when people's meaning frameworks are undermined, they

compensate by affirming an unrelated framework (Proulx & Heine, 2006, 2008).

Nevertheless, it has been suggested that the beneficial effects of indirect coping

strategies may not endure over time, and people might first try to address a threat

directly and, only when that seems unfeasible, might they attempt to affirm

alternative meaning domains (Heine et al., 2006; Proulx & Inzlicht, 2012). Indeed,

when people's sense of belonging is undermined, they prefer to restore it directly by

affirming social values rather than intellectual values (Knowles et al., 2010).

Among studies that have aimed directly to influence people's MIL ratings,

only a few have looked at the interaction between two or more predictors. Several

studies have shown that when positive social relatedness information was available,

it was used to inform MIL judgments, whereas otherwise participants relied on their

affective state (Hicks & King, 2009b; Hicks, Schlegel, & King, 2010). This result

suggests that being in a good mood and thinking about relationships does not have

an additive effect on MIL. Nevertheless, this finding might be specific to mood as a

source of MIL. According to mood as information accounts (Schwarz & Clore, 2003,

1983), when people judge an abstract life domain, they tend to rely on affect when

more relevant information is not salient. In order to test whether sources of MIL are

substitutable with each other or additive, two similarly relevant sources of MIL

should be manipulated. While there is little prior evidence for an additive account, it

would make conceptual sense that an abstract and encompassing life appraisal such

as judging MIL would involve aggregating information from several domains.

Measuring Meaningfulness: Distinguishing MIL and Purpose in Life

MIL has been mainly studied as a subjective experience (Hicks & King,

2009a). The most widely-used measure of MIL, the Meaning in Life Questionnaire –

Presence subscale (MLQ-P; Steger et al., 2006) has items asking people to make an

abstract judgment about the meaningfulness of their lives (e.g. "I have a good sense of what makes my life meaningful"). Notably, three of the five MLQ-P items are related to purpose, and previous research has used the terms *MIL* and *purpose in life* interchangeably (e.g., Boyle, Barnes, Buchman, & Bennett, 2009; Crumbaugh & Maholick, 1964). However, recently the two constructs have been discussed separately (e.g., McKnight & Kashdan, 2009). Furthermore, George and Park (2013) found that while the two constructs are strongly correlated ($r = .61$), measures of sense of MIL and purpose were related to different constructs. Sense of MIL was positively related to religiousness and spirituality, whereas sense of purpose was positively related to optimism, as well as negatively associated with pessimism, stressful life experiences, and goal violations.

Current Study

Here, we aimed to test whether two theoretically non-overlapping experiences (sense of belonging and sense of personal control) would be substitutable or additive in influencing MIL ratings. We asked participants to write two essays. For one of the essays, half of the participants wrote about a situation when they felt rejected (low belongingness), and the other half wrote about a time when they felt accepted (high belongingness). In the other essay, half of the participants wrote about a situation where they were not in control (low control), and the other half about when they were in control (high control). We obtained participants' judgments of meaningfulness and purpose in life in a preliminary test one week before the lab visit and, again, immediately after the manipulation. This allowed us to determine the change in MIL and purpose judgments due to our manipulation, compared to participants' baseline levels.

We expected that individuals who experience mixed conditions of either low-belonging and high-control, or high belonging and low control, would report levels of MIL comparable to baseline, regardless of the process by which sources contribute to MIL. If the sources are additive, then undermining one while boosting another should cancel the two effects. If they are substitutable then participants will use the affirmed source to restore the threatened sense of MIL. Similarly, when both belonging and control are undermined, participants should experience lowest levels of MIL. Evidence for either additive or substitutable accounts of MIL processes should emerge when bolstering both belongingness and control. If the effects are additive, then this doubly affirming condition should result in the highest MIL ratings. If the sources are substitutable, then this should elicit levels of MIL ratings similar to the mixed condition: the second positive meaning source would be redundant after reaping the benefits of the first one.

In addition, aside from a measure of self-reported MIL, we also included a measure of purpose. Given previous research showing MIL and purpose having distinct correlates (George & Park, 2013), we aimed to explore whether belongingness and control have the same pattern of relationships with purpose as they do with MIL. For instance, personal control might be more strongly predictive of purpose than of MIL.

Method

Participants

Participants were recruited among undergraduate psychology students in exchange for credits. The study was also advertised to other University of Sussex students and staff, who were invited to participate voluntarily. One hundred and forty-four participants completed our preliminary measures, but, of these, only 120

attended the main experimental study. Of the latter, 8 cases could not be matched across time points, possibly because the participants mistyped their unique identifying codes.

Our final sample consisted of 112 participants (87 women, 23 men, 2 non-specified "other")[2]. Of these, 104 were University of Sussex students. Due to a programming error, participant age was not recorded. However, participants had to confirm that they were at least 18 years old before proceeding to the study. Given previous data collected among the student population at University of Sussex, age is expected to range between 18 and 54 (see Paper 3). The majority of participants reported being born in the UK ($N = 69$; 61.1%) with the remaining participants coming from a mix of countries. Most participants were not religious ($N = 84$; 75%), followed by Christians ($N = 22$; 19.6%).

Materials and Procedure

Preliminary measures. One week before the main study (T1), participants completed an online questionnaire containing items that assessed demographics as well as sense of purpose and MIL. In order to measure sense of MIL, we used items adapted from Wong's (1998) Perceived Personal Meaning Scale (PPMS) and the Meaning in Life Questionaire - Presence subscale (MLQ-P, Steger et al., 2006). The scale included items such as "My entire existence is full of meaning" and "My life is meaningless" (reverse-coded) and had excellent reliability ($\alpha = .93$). Sense of purpose was measured using items adapted from the Purpose subscale of Ryff's (1989) Psychological Well-Being Scales), e.g. "I have a good sense of what I am

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[2] Previous studies testing the effect of feelings of relatedness on self-reported MIL and their interaction with another measured variable (e.g., positive affect) have found a significant effect with as few as 65 student participants (Hicks & King, 2009b, Study 3). However, given the scarcity of evidence showing that personal control manipulations influence feelings of meaningfulness, we aimed to overrecruit.

trying to accomplish in life" and "I often feel like I am wandering aimlessly through life" (reverse-coded). The scale had very good reliability ($\alpha = .88$). The two scales were highly correlated, $r = .72$. Participants were invited to schedule a time when they could come to the laboratory and complete the main part of our study. The booking had to be made at least 7 days after completing the initial survey, so as to reduce demand characteristics.

Main study. In the main part of the study (T2), participants were led to a private cubicle where they were invited to follow the instructions on the computer screen. Participants first completed the two essays about belonging and personal control. For the belonging essay, half of the participants were allocated to the low belonging condition whereas the other half were allocated to the high belonging condition. Participants were split in the same way for the control essay. Participants were semi-randomly allocated to conditions by Qualtrics (https://www.qualtrics.com/; the option to ensure relatively even allocation was selected). The order in which they completed the essays on control and belonging was counterbalanced.

The high [low] belonging essay instruction (adapted from Knowles et al., 2010) read:

> Please recall a particular incident in which you have felt accepted [intensely rejected] in some way, times that you felt as if you belonged [did not belong]. These can be experiences of acceptance [rejection] from another person (e.g. a time when someone wanted to be your friend [a time when someone no longer wanted to be your friend]) or they can be experiences of acceptance [rejection] from a group (e.g., a time when you were included in a

group of people [a time when you were excluded from a group of people]).

Please describe the situation in which you felt you belonged [did not

belong]– what happened, how you felt, etc.

The high [low] control essay instruction (adapted from Whitson & Galinsky,

2008) read:

Please recall a particular incident in which you were in complete

control of the situation [you did not have any control over the situation].

Please describe the situation in which you felt in complete control [a

complete lack of control]– what happened, how you felt, etc.

Following the manipulation, mood was measured using the Positive and

Negative Affect Schedule (PANAS; Watson et al., 1988). Participants were

presented with 10 negative affect (NA) words (e.g., "Stressed"; $\alpha = .86$) and 10

positive affect (PA) words (e.g., "Excited"; $\alpha = .90$) and were asked to respond about

how they felt "at the present moment" on a scale from 1 = "Very slightly or not at

all" to 5 = "Very much". Then, participants answered the same measures of sense of

MIL ($\alpha = .91$) and purpose ($\alpha = .88$) that had been presented in the preliminary

questionnaire. Upon finishing the questionnaire, participants were debriefed by the

experimenter and were given the opportunity to ask any questions about the study.

Participants' data were anonymously matched across the two time points using a

unique identifying code (see Appendix 2).

Results

Manipulation Check and Randomisation Check

First, we inspected the essays produced in response to our manipulation prompt. Two cases were excluded because participants did not comply with the manipulation (e.g., "To be honest, I cannot remember a particular incident in which I felt rejected in some way.").

To check that we randomly allocated participants to conditions, we first tested whether participants had similar baseline levels of MIL and purpose at Time 1 in each of the four conditions. We ran a one-way MANOVA with four levels corresponding to each of the study conditions (high-belonging-high control, high belonging-low control, low belonging-high control, low belonging-low control). There was a significant multivariate effect: $F(6, 216) = 2.38$, $p = .030$, $\eta_p^2 = .062$. However, separate univariate ANOVAs revealed non-significant effects of condition on Time 1 MIL, $F(3, 108) = .934$, $p = .427$, $\eta_p^2 = .025$, and on Time 1 purpose, $F(3, 108) = 2.12$, $p = .102$, $\eta_p^2 = .056$.

We also ran Chi-square tests of association with gender (male and female), $\chi^2(3) = 1.47$ $p = .690$, country of birth (recoded as UK and non-UK), $\chi^2(3) = 3.34$, $p = .342$, and religious belief (recoded as non-religious and religious), $\chi^2(3) = 2.08$ $p = .556$. All were non-significant, suggesting that random allocation was successful.

Ideally, our manipulations would not influence mood. Consequently, we ran a 2 (low belonging vs. high belonging) by 2 (low personal control vs. high personal control) between-participants MANOVA on positive affect and negative affect. As expected, multivariate tests showed no significant main effects by type of manipulation: belonging, $F(2, 107) = .79$, $p = .457$, $\eta_p^2 = .015$; personal control, $F(2,$

$107) = 1.43$, $p = .243$, $\eta_p^2 = .026$. Similarly, there was no significant multivariate

interaction effect, $F(2, 107) = .54$, $p = .583$, $\eta_p^2 = .010$.

Main Analyses

In order to control for Time 1 MIL and Time 1 purpose, we created *MIL*

difference and *purpose difference* scores by subtracting Time 1 MIL and purpose

scores, respectively from their Time 2 counterparts. Scores on these difference

variables showed a leptokurtic distribution. This was addressed by removing 8 cases

with unusually high/low scores (as identified by inspecting the boxplots)[3].

Descriptive statistics for the two outcome variables across the four study conditions

are displayed in Table 2.1.

Table 2.1. Means (standard deviations) for MIL difference and purpose difference scores
across conditions

	Belonging			
	Low		High	
	Personal control		Personal control	
Outcome variable	Low	High	Low	High
	(N = 21)	(N = 30)	(N = 35)	(N = 22)
MIL difference	.09 (.81)	.22 (.67)	.27 (.69)	.27 (.63)
Purpose difference	.12 (.65)	-.01 (.61)	.13 (.57)	-.04 (.66)

We ran a two-way MANOVA to test whether the belonging and control

manipulations led to significant changes in MIL judgments and sense of purpose.

There were no significant multivariate effects: main effect of belonging, $F(2, 99) =$

$.44$, $p = .644$, $\eta_p^2 = .009$; main effect of personal control, $F(2, 99) = 1.16$, $p = .317$,

$\eta_p^2 = .023$; interaction, $F(2, 99) = .65$, $p = .526$, $\eta_p^2 = .002$. Similarly, there were no

significant univariate effects in predicting change in MIL judgments, Fs$(1, 100) =$

$.20$ - $.73$, ps $= .395$ - $.653$, or in sense of purpose, Fs$(1, 100) = .01 - 1.45$, ps $= .232$ -

$.931$.

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[3] We also ran the subsequent analyses with these 8 cases included and this did not change the
results substantively.

Discussion

In this study, we aimed to test the interaction between belongingness and control in influencing MIL and purpose ratings. Nevertheless, both our sense of belonging and sense of personal control manipulations failed to significantly influence changes in MIL or purpose ratings. Consequently, our study could not differentiate between accounts that explain the effects of sources of MIL as additive or substitutable. Furthermore, we could not observe differential effects of these sources on MIL and purpose.

In our design we assumed that the low control and low belonging condition would elicit the lowest levels of MIL, even if participants in the other conditions would display similar levels of MIL (as predicted by a substitutable account). However, if people felt threatened by our manipulation, this might not have been captured by the MIL measure used. Self-reported ratings of meaningfulness might fail to capture how meaningful one's life actually is (Leontiev, 2013). This might be analogous to the literature on *defensive* or fragile *self-esteem*, where people's self-reported levels of an experience might not align with levels captured by more implicit measures (Jordan et al., 2003; Kernis, 2005; Laws & Rivera, 2012). To the extent that people sometimes respond to threats automatically (e.g. Brady et al., 2016) and threats to meaning trigger fluid compensation (e.g. Heine et al., 2006; Proulx et al. 2012), people might inflate their MIL ratings as a form of compensating to having their sense of belonging and personal control undermined. In previous research, when people were subliminally primed with meaninglessness-related words (e.g., empty, futile), they reported higher levels of MIL (Van Tongeren & Green, 2010). As such, given that participants might use self-reported MIL

measures as an opportunity to restore threatened MIL, future studies should look into alternative ways of capturing MIL fluctuations.

PAPER 3: Meaning is about mattering: Distinguishing the roles of significance,

purpose, and coherence in experiencing meaningfulness

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Reference:

Costin, V., & Vignoles, V. L. (2017). *Meaning is about mattering: Distinguishing the roles of significance, purpose, and coherence in experiencing meaningfulness.* Manuscript in preparation.

Abstract

The concept of meaning in life (MIL) has traditionally suffered from definitional ambiguity. Recent theoretical accounts have implicated three reflective components (i.e., a product of active, effortful deliberation) in the experience of MIL: coherence, purpose and significance. However, very little empirical research has tried to separate the three dimensions and determine their relationship to MIL judgments. In Study 1 ($N = 314$; social media snowball sampling), we improved the measurement of these constructs by adding reverse-phrased items and controlling for acquiescence. Using confirmatory factor analysis, we showed that sense of coherence, purpose, significance and MIL judgments were separable constructs, and that they were distinct from related constructs (e.g., self-esteem). Study 2 (T1 $N = 168$, T2 $N = 135$, T3 $N = 121$; student sample) and Study 3 (T1 $N = 442$, T2 $N = 326$; Prolific Academic respondents) employed longitudinal designs with measurements spaced one month apart aiming to test the directional relationship between coherence, purpose, significance, and MIL judgments. Across Studies 2 and 3, sense of significance consistently emerged as a prospective predictor of MIL judgments. Purpose and sense of coherence did not significantly predict MIL judgments across time. However, this was qualified by a moderating effect of religion: MIL judgments were predicted by purpose and significance for non-religious participants, and by coherence and significance for religious participants. These results have implications for the role of reflective processes on MIL judgments. Notably, significance emerges as a context-independent key component of experiencing one's life as meaningful.

Keywords: meaning, meaning in life, purpose, coherence, significance

Introduction

Experiencing one's life as meaningful is associated with measurable benefits. Self-reported meaning in life (MIL) has been linked to healthier eating, more physical activity, higher life satisfaction and lower depression (e.g., Brassai et al., 2015; Steger, Oishi, & Kashdan, 2009; Zika & Chamberlain, 1992). MIL is also distinct from other well-being constructs. For instance, Steger and Kashdan (2007) found that MIL recorded a year later was predicted by initial ratings of MIL, but not by life satisfaction. Despite its usefulness, the concept of MIL has raised unique challenges for empirical researchers trying to converge on a unitary definition (Leontiev, 2013). Psychologists have often focused on the subjective experience of MIL (e.g., Hicks & King, 2009a). However, treating meaning as a subjective judgment raises the question: What is this judgment about?

Meaning in Life as Subjective Judgment

MIL is an abstract construct that is related to leading a "good life", perhaps according to some objective criteria (e.g., Wolf, 2010). Nevertheless, some have pointed to the difficulty in defining such criteria, while others have questioned the utility of having any objective components in definitions of MIL (e.g., Haidt, 2010; Koethe, 2010). Most research within psychology has avoided such debates by focusing on subjective appraisals called *MIL judgments* (or *sense of MIL)*. These are captured in people's responses to statements such as "My life is meaningful" (George & Park, 2016a; Heintzelman & King, 2014b). In turn, MIL judgments have been criticised for asking participants directly about meaningfulness when there is currently no consensually agreed definition of MIL (Leontiev, 2013). Furthermore, MIL judgments seem to be influenced by unrelated factors such as positive affect (e.g., King et al., 2006).

Meaning in Life as Coherence, Purpose and Significance

In order to address some of these shortcomings (George & Park, 2016a; Leontiev, 2013), researchers have suggested increasingly sophisticated definitions, portraying MIL as a multi-faceted construct:

"Meaning is the web of connections, understandings, and interpretations that help us comprehend our experience and formulate plans directing our energies to the achievement of our desired future. Meaning provides us with the sense that our lives matter, that they make sense, and that they are more than the sum of our seconds, days, and years." (Steger, 2012a, p. 165).

Such definitions suggest that a meaningful life is characterised by three dimensions: coherence, purpose and significance (King et al., 2006; Steger et al., 2006; see also Reker & Wong, 1988). Models of MIL based on these dimensions are sometimes referred to as *tripartite models* (see George & Park, 2016a; Martela & Steger, 2016).

Coherence has been defined as the process of making sense of one's experiences or the world more broadly (Heintzelman & King, 2014a), and has often been conflated with meaning (e.g., Heine et al., 2006). For instance, absence of meaning has been described as resulting from perceived inconsistencies or an "awareness of *nonrelations*" (see Proulx & Heine, 2010; cf. Nagel, 1971). Furthermore, the widely used Meaning in Life Questionnaire – Presence subscale (MLQ-P; Steger et al, 2006) contains items related to comprehension and coherence such as "I understand my life's meaning". Evidence suggests that MIL might depend on perceiving regularities in one's environment (Heintzelman et al., 2013). However, if coherence predicts a dependent variable that also measures coherence, then the

finding is tautological. Instead, the link between sense of coherence and sense of MIL should be tested empirically rather than assumed.

Different kinds of coherence (e.g., coherence in self views versus coherence about the world) have been seen as equivalent (see Heine et al., 2006). When faced with information that undermines coherence, people often use strategies that are not specific to the type of coherence being undermined. Despite these fluid compensation mechanisms, however, different kinds of consistency violations might be perceived differently. For instance, one can selectively induce feelings of uncertainty about the self without influencing general feelings of uncertainty (see Paper 1). Given that sense of MIL is linked to identity processes (e.g., Vignoles et al., 2006; see also Vignoles, 2011), and that MIL is personal, focusing on "*my* life", we suggest that self-related coherence (similar to life story schema construction; Bluck & Habermas, 2000) is the key sense-making dimension of MIL. Self-related sense of coherence will be henceforth simply called *sense of coherence*, defined as the feeling of "making sense of one's experiences in life" (Reker & Wong, 1988, p. 220).

Similar to coherence, *purpose* has also been conflated with earlier measures of MIL, e.g., "My personal existence is: (1) utterly meaningless, without purpose, (5) purposeful and meaningful" (Purpose in Life Test; Crumbaugh & Maholick, 1964), three out of five of the MLQ-P items (Steger et al., 2006) are related to purpose Nevertheless, there is a growing consensus that purpose is a separate but related construct (George & Park, 2013; Kashdan et al., 2015; McKnight & Kashdan, 2009). For the current paper, purpose is seen as a motivational dimension of MIL (Martela & Steger, 2016), defined as "a central, self-organizing life aim that organises and stimulates goals, [and] manages behaviors" (McKnight & Kashdan, 2009, p. 242).

Consequently, having a sense of purpose is the feeling of having a life aim and working towards fulfilling it. Having a sense of purpose has been associated with important positive outcomes such as lower mortality rates (Boyle et al., 2009; Hill & Turiano, 2014).

S*ignificance* (also called "mattering"; George & Park, 2014) refers to value, worth and importance (Martela & Steger, 2016) and transcending "the trivial or momentary" conditions of our lives (Heintzelman & King, 2014a). Having a sense of significance involves feeling that one's life matters, and that it is worth living (Martela & Steger, 2016; George & Park, 2016a). While MIL researchers have hinted at similar meaning-related constructs in the past (e.g., the "valued life" dimension; Morgan & Farsides, 2009), significance has received less empirical attention compared to the other two MIL dimensions (George & Park, 2014).

Measuring Sense of Coherence, Purpose, and Significance

If MIL is about coherence, purpose and significance, then *feeling* a sense of coherence, purpose and significance should predict *feelings* of MIL (i.e., MIL judgments). George and Park (2016b) showed that sense of significance, purpose and coherence accounted for 60-71% of the variance in MIL judgments. However, despite reporting correlations between the dimensions and positive affect, they did not directly test whether mood explains the relationship between significance, purpose, coherence, and MIL judgments. Furthermore, results are based on cross-sectional data, making it unclear whether the feeling of meaningfulness is *about* significance, purpose and coherence or vice versa.

Martela and Steger (2016) expect that the three dimensions will be closely related to one another. For instance, perceiving that one's life is fulfilling a broader purpose might engender a sense of significance. This can be seen in the context of

religious belief. Religion can prescribe a sense of purpose consisting of "spiritual strivings" which involve transcending the self and forming a union with a higher power (Emmons, 2005). The contrast between the fleeting smallness of one's life and the vastness of the Universe (e.g., George & Park, 2014) is then bridged by having a sacred purpose that makes one feel that life matters on a higher level. The reverse is also plausible: feeling that life matters would lead to a stronger sense that there are objectives worth pursuing (Martela & Steger, 2016). Similarly, if one believes that one's life is significant, then an individual might be more likely to project order onto one's life experiences, thus increasing one's sense of coherence. In turn, sense of coherence seems necessary for seeing unifying themes in one's goals and constructing future objectives.

George and Park (2016b) werethe first to attempt to separate empirically the dimensions of significance, purpose and coherence. In their Multidimenstional Existential Meaning Scale (MEMS), each of the three dimensions showed a different pattern of correlations with theoretically-related constructs, providing evidence that they are distinct facets of meaning. However, the measure did not have a balanced set of positive and reverse-phrased items, which raises the issue of whether relationships between the variables are not a product of acquiescent response style, i.e., participants' "tendency to agree with attitude statements regardless of content" (Winkler, Kanouse, & Ware, 1982, p. 555)[4].

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[4] Some studies suggest that reverse-phrased items might be a source of bias and advise against using them (e.g. Schriesheim & Hill, 1981). Nevertheless, the advantages of negative responses might outweigh the problems, especially if these are used in a balanced way (even numbers of negatively and positively phrased items), are dispersed throughout the questionnaire, are carefully worded (e.g., avoiding the use of negation) and use fully labelled response scales (Weijters & Baumgartner, 2012). One can control for acquiescent responding by including several reverse phrased items and modelling a common method variance factor (Welkenhuysen-Gybels, Billiet, & Cambré, 2003).

Dimensions of MIL and Related Constructs

Dimensions of MIL are similar to previously studied constructs within psychology which have also been associated with sense of MIL. To establish the utility of tripartite accounts in predicting MIL judgments, one would need to distinguish them from such theoretically-related constructs. For instance, significance is a self-relevant evaluative construct, similar to self-esteem (Rosenberg, 1965). Furthermore, previous research has hypothesised links between self-esteem and sense of MIL (Greenberg, Pyszczynski & Solomon, 1986), and has shown that identities are rated as more central if they satisfied needs of both MIL and self-esteem (Vignoles et al., 2006). However, self-esteem is an inadequate dimension of MIL because it operates at a lower level of abstraction compared to sense of significance, construed as a "global evaluation from a spiritual or existential level" of one's life (George & Park, 2014, p. 47).

Additionally, significance needs to be separated from measures of social relatedness, which are also linked to self-worth (Baumeister & Leary, 1995; Leary, 2005). Close relationships have been consistently associated with sense of MIL across qualitative and quantitative studies (see O'Donnell et al., 2014). Specifically, belonging, defined as "a secure sense of fitting in" (Lambert et al., 2013, p. 1418), has been suggested as the key feature of social relationships that leads to perceiving life as meaningful.

Furthermore, competence and autonomy have been related to eudaimonic well-being (i.e., wellness obtained through self-actualization rather than subjective happiness; Ryan & Deci, 2001). A recent study found that autonomy, competence and relatedness were positively predictive of MIL scores three days later (Martela et al., 2017). Autonomy (i.e., a desire to "self-organise experience and behaviour";

Deci & Ryan, 2000, p. 231) has been indirectly related to the notion of coherence (through the related construct of control; Whitson & Galinsky, 2008). In contrast, competence is related to having a sense of efficacy (Ryan & Deci, 2000). As such, competence would be more related to attaining desired outcomes and achieving goals (Bandura, 1977; Tafarodi & Swann, 2001) and, consequently, more related to having a sense of purpose.

The dimensions of MIL are often more integrative life-appraisals than their non-MIL-related counterparts. However, the usefulness of tripartite accounts of meaning depends on whether significance, purpose and coherence are separable from each other, as well as distinct from, but related to, self-esteem, belonging, competence, and control.

Overview of the Present Studies

The current paper has three aims: (a) to test whether significance, purpose, coherence, and MIL judgments are distinct constructs that are also separable from theoretically-related predictors of MIL; (b) to understand the unique contribution of each of the three dimensions of MIL to MIL judgments; (c) to test the prospective direction between each of the three dimensions and MIL judgments.

To address these aims, in Study 1, we developed a set of items that could measure significance, purpose, coherence, and MIL judgments, without overlap with other conceptually-related predictors of MIL, while controlling for acquiescent response style by modelling this as a common method variance factor. Additionally, Study 1 provided a cross-sectional test of the expected relationships from significance, purpose, and coherence to MIL judgments, while controlling for mood. Studies 2 and 3 used causally-sensitive longitudinal designs to test whether MIL judgments were predicted by the three dimensions or vice versa. Both studies tested

the constructs using latent factors to control for measurement error and partialling

out acquiescence. Data was analysed using cross-lag panel analysis which controls

for participants' responses at an earlier time point on the same measure. Based on

findings from Study 2, we pre-registered Study 3 (e.g. hypotheses, sample size,

analyses to be performed) prior to collecting and analysing our data.

Study 1

The first step was to create items that measured sense of significance,

purpose, and coherence, as well as MIL judgments, and to test whether these four

constructs are distinguishable from one another. Our scale was inspired by the

MEMS (George & Park, 2016b), with added items to capture additional facets, e.g.

coherence items related to life story schema coherence (Bluck & Habermas, 2000).

We sought to create short measures (4 items) that still retained desirable scale

properties. Furthermore, we aimed to test that the dimensions, and MIL judgments

are not confounded with theoretically-related constructs (self-esteem, self-

competence, belonging and control) or affect, which has been shown to contaminate

MIL ratings (King et al., 2006). Throughout our models, we controlled for

acquiescent responding. Unlike previous measures (e.g., George & Park, 2016a), we

aimed to include a balanced set of positive and reverse-phrased items.

Method

Participants and procedure. An online survey (see Appendix 3) was

created using Qualtrics (https://www.qualtrics.com/). Data were collected online

using snowball sampling through social networking websites (Facebook, Twitter).

The study was advertised to people over the age of 18 who had "a good level of

English" as a study about "how people experience their lives as having or not having

meaning". Participants' mood was first measured, followed by MIL judgments.

Subsequent measures were displayed in a randomised order for each participant. Finally, participants provided demographic information.[5]

Of the 403 participants who accessed our questionnaire, 84 participants quit before proceeding to the questionnaire items. This left 319 participants out of whom 5 were excluded owing to non-engagement with the items: they gave the same response to all items of a measure (e.g., *Neither agree nor disagree* for all statements that formed a scale).

The final sample consisted of 314 participants (166 complete responses). Missing data was handled using full maximum likelihood estimation. Demographic information was recorded at the end of the questionnaire, so we only have complete demographics for complete responses. The mean age was 31.77 ($SD = 10.97$) and ranged from 18 to 78. There were 116 females, 49 males, and 1 agender. Participants were from a mix of countries, most were Romanian ($N = 70$), followed by British ($N = 41$), then from USA and Canada ($N = 23$). Most participants were Christian ($N = 87$) and 8 reported other religious backgrounds, while the rest ($N = 71$) did not have any religious affiliation. Participants were highly educated: 86 reported having a Masters degree or higher, and only 21 participants were educated only to high-school level.

Measures. An item pool was created for significance, purpose, coherence, MIL and related constructs. For all items described below, participants were asked to indicate their "feelings at the present moment". Unless otherwise specified, all

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[5] Participants were invited to provide their email address to be contacted for follow-up questionnaires. Because of the very low sign-up, data from these later time points were not included in the final analysis.

responses were recorded on a 7-point scale (1 = *Strongly disagree*; 7 = *Strongly agree*).

MIL judgments. The measure aimed to captured an overall, abstract feeling of meaningfulness, without involving any of the three dimensions of meaning. Six items (3 reversed) were inspired or adapted from the MLQ-P (Steger et al., 2006) and from the Perceived Personal Meaning Scale (PPMS; Wong, 1998). Items included: "My life as a whole has meaning" and "My existence is empty of meaning" (reverse-phrased).

Sense of coherence. We compiled a 17-item pool pertaining to self-related coherence. This included all comprehension items from the MEMS scale (George & Park, 2016b), e.g. "I can make sense of the things that happen in my life". Additionally, items about life story schema coherence (Bluck & Habermas, 2000) were created. These related to the concept of temporal coherence, similar to the notion of self-continuity (i.e., "the need to feel a connection between past, present, and future identities", Vignoles, 2011, p. 413), e.g. "I can see a connection between past, present and future events in my life", thematic coherence (i.e., perceiving a consistent theme throughout life-events), e.g. "My experiences tend to have common themes", and causal coherence (i.e., sense that one can generate explanations of why events occurred and how they led to future ones), e.g. "I can see how my decisions are influenced by my previous experiences". Reverse-phrased counterparts were also included (7 reversed), e.g. temporal coherence: "I see past, present and future events in my life as disconnected".

Sense of purpose. As with coherence, we included items from the MEMS scale such as "I have overarching goals that guide me in my life". We also adapted items from the purpose subscale of the Ryff Psychological Well-Being Scales (Ryff,

1989): "I often feel like I am wandering aimlessly through life" (reverse-phrased). There were 15 purpose items in total (6 reversed).

Sense of significance. "Mattering" items from the MEMS scale were used to capture the significance construct, e.g. "Even considering how big the universe is, I can say that my life matters." Reverse-phrased items that corresponded to the existing ones were added, e.g. "Given the vastness of the universe, my life does not matter". Additionally, we created an item and its reverse-phrased counterpart that did not make reference to grander notions of time or the universe, e.g. "My life is inherently valuable". In total, there were 9 sense of significance items (4 reversed).

Sense of control. Six items (3 reversed) were generated based on the personal control manipulation checks used in the compensatory control literature (e.g. Kay, Gaucher, Napier, Callan, & Laurin, 2008), e.g. "The events in my life are mainly determined by my own actions", "I feel constrained by things outside of my control." (reverse-phrased).

Sense of belonging. We aimed to capture feelings of acceptance and fitting in rather than simply having close relationships (Lambert et al., 2013). For this purpose, 10 items (5 reversed) were adapted from the Sense of Belonging Inventory – psychological state (SOBI-P; Hagerty & Patusky, 1995), e.g. "I feel that I fit in" and from Lee and Robbins' (1995) Social Connectedness Scale (e.g. "I don't feel that I participate with anyone or any group", reverse-phrased).

Self-esteem and self-competence. The Self-liking/Self-competence Scale – Revised version (SLCS-R; Tafarodi & Swann Jr., 2001) had 16 items in total with 8 items per scale (4 reversed). The self-liking scale included items such as "I am very comfortable with myself", while the self-competence scale included items such as "I am highly effective at the things I do".

Mood. The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) included 10 negative affect words (e.g. "Stressed") and 10 positive affect words (e.g. "Excited"). For each word, participants were asked to respond about how they felt "at the present moment" on a scale from 1 = "Very slightly or not at all" to 5 = "Very much".[6]

Results

Analytical approach. Analyses were performed using MPlus Version 6 (Muthén & Muthén, 2010). All models were estimated using full maximum likelihood. In order to assess the global fit of our models, we followed Hu and Bentler's (1999) criteria for considering a good fitting model to the data: (1) root mean square error of approximation (RMSEA) values close to .06 or below, (2) standardised root mean square residual (SRMR) close to .08 or below. Hu and Bentler (1999) recommend accepting models with a comparative fit index (CFI) value of .95 or greater, but others have criticised this standard as being too stringent for many models (Marsh, Hau, & Wen, 2004). As such, values of CFI higher than .90 were considered acceptable (Brown, 2015). Finally, we also reported χ^2 despite its many important shortcomings in assessing global fit (Brown, 2015; Kline, 2005). The χ^2 was used for comparisons between nested models where a statistically significant $\Delta\chi^2$ suggests that the more inclusive model is a better fit to the data. These criteria will be used in all subsequent studies unless otherwise specified.

Item selection and construct validation. We ran a confirmatory factor analysis (CFA) with the expected 8 factors: MIL, significance, purpose, coherence,

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[6] We also measured: belief in freewill / determinism (FAD-Plus; (Paulhus & Carey, 2011), religious belief (Steger & Frazier, 2005), belief in a controlling God (Kay et al., 2008), identification with family members, close friends and "important others" using the Inclusion of Others in Self scale (IOS; Aron, Aron & Smollan, 1992), and government support (Kay, Shepherd, Blatz, Chua, & Galinsky, 2010). Results from these measures will be reported elsewhere.

belonging, control, self-liking and self-competence. Indicators corresponding to each predicted latent factor were a balanced mix of positively and negatively worded items. Following the instructions of Welkenhuysen-Gybels et al. (2003), we controlled for acquiescence by modelling it as a common method variance (CMV) latent factor that loaded onto each item, with all loadings fixed to 1. The CMV factor was assumed to be uncorrelated with the target constructs: its covariance with other latent factors in the model was fixed to 0.

The initial CFA showed adequate fit for RMSEA and SRMR, but the CFI was poor: $\chi^2(2973) = 5484.24$, p < .001; CFI = .79; RMSEA = .053 (90% CI = .051 - .055); SRMR = .074. In aiming to improve the fit of our model and reduce our total item pool, we excluded items from newly developed scales in the following order: (a) based on low factor loadings – $|\beta s| < .4$ (6 items removed); (b) based on cross-loadings - if an item had a modification index (MI) of more than 10 and two or more other significant cross-loadings (MI > 4), or two cross-loadings with MIs larger than 10, then that item was dropped (16 items removed); (c) if item removal produced only minimal loss of scale reliability while still maintaining reliability scores over .8 (7 items removed). We aimed to remove items in such a way that maintained a balance of positive and negatively worded items. No items were removed from the previously validated SLCS-R. The final model showed adequate fit: $\chi^2(831) = 1414.37$, p < .001; CFI = .894; RMSEA = .048 (90% CI =.044 - .053); SRMR = .062[7]. All factors loaded significantly onto their respective latent factors ($|\beta s| > .49$, *p* < .001; see Table 3.1) and there was little cross-loading (estimated

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[7] Even though the CFI was marginally below the conventional threshold of .90, CFI is known to decline in correctly specified models with larger numbers of variables, and it should be judged in conjunction with the RMSEA (Kenny & McCoach, 2003). Given that both the RMSEA and SRMR were below their thresholds of .06 and .08, respectively, we consider the model to be of adequate fit.

standardised path coefficients < .30)[8]. We calculated composite reliabilities for each

latent factor using the formula proposed by Raykov (1997) and all values were larger

than the recommended value of .70 (Hair, Black, Babin & Anderson, 2010).

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[8] As an additional check, we also ran a simple structure random intercept exploratory factor analysis (RI-EFA; Aichholzer, 2014) using the final, four-item solution for each MIL-related construct (MIL judgments, coherence, purpose, and significance), while modelling acquiescence as an individual random intercept and using the oblique Quartimin rotation. The model had an excellent fit, $\chi^2(61) = 107.90$, $p < .001$; CFI = .980; RMSEA = .051 (90% CI: =.035, .066); SRMR = .023. Items showed standardized loadings above .54 on their target factor, with the exception of the item "My life feels like a sequence of unconnected events" ($\beta = .36$). Standardized cross-loadings were smaller than .21, with the exception of item "I don't know what I'm trying to accomplish in life" ($\beta = .33$).

Table 3.1. Final selection of MIL items and related constructs in Study 1

Scale and Items	Composite Reliability[a]	Standardised Factor Loadings
MIL judgments (4 items)	.89	
My life as a whole has meaning.		.79
My entire existence is full of meaning.		.82
My life is meaningless.		-.81
My existence is empty of meaning.		-.83
Purpose (4 items)	.85	
I have a good sense of what I am trying to accomplish in life.		.83
I have certain life goals that compel me to keep going.		.72
I don't know what I am trying to accomplish in life.		-.81
I don't have compelling life goals that keep me going.		-.69
Coherence (4 items)	.77	
I can make sense of the things that happen in my life.		.57
Looking at my life as a whole, things seem clear to me.		.75
I can't make sense of events in my life.		-.77
My life feels like a sequence of unconnected events.		-.60
Significance (4 items)	.92	
Whether my life ever existed matters even in the grand scheme of the universe.		.87
Even considering how big the universe is, I can say that my life matters.		.85
My existence is not significant in the grand scheme of things.		-.85
Given the vastness of the universe, my life does not matter.		-.89
Control (5 items)	.75	
The events in my life are mainly determined by my own actions.		.69
I feel like I am free to make my choices.		.71
I feel that I have complete control over my life.		.66
I am not in control of most things that occur in my life		-.49
I feel constrained by things outside of my control.		-.52
Belongingness (6 items)	.90	
I feel included.		.86
I feel that I fit in.		.84
I feel accepted.		.78
I don't feel that I participate with anyone or any group.		-.61
I feel excluded.		-.77
I feel like an outsider.		-.77
Self-liking (8 items)	.93	
I tend to devalue myself.		-.72
I am very comfortable with myself.		.84
I am secure in my sense of self-worth.		.83
It is sometimes unpleasant for me to think about myself.		-.68
I have a negative attitude towards myself.		-.89
I feel great about who I am.		.85
I never doubt my personal self-worth.		.71
I do not have enough respect for myself.		-.74
Self-competence (8 items)	.83	
I am highly effective at the things I do.		.76
I am almost always able to accomplish what I try for.		.63
I perform very well at many things.		.67
I am very talented.		.53
At times, I find it difficult to achieve the things that are important to me.		-.60
I sometimes deal poorly with challenges.		-.66
I sometimes fail to fulfil my goals.		-.64
I wish I were more skilful in my activities.		-.46

Note. All factor loadings were significant at $p < .001$.

[a] Composite reliabilities calculated using Raykov's (1997) formula for latent factors

All the latent factors were significantly correlated with each other (ps <.001) and, critically, intercorrelations between the each of the three dimensions and the other predictors of MIL ranged between .37 and .63 (see Table 3.2). This suggests that the dimensions do not overlap with other relevant concepts, supporting the separation between dimensions and predictors of MIL. However, intercorrelations between MIL judgments and the dimensions were higher, ranging from .65 to .72, raising the possibility that one of the meaning dimensions could be redundant with the other two.

Table 3.2. Intercorrelations between MIL judgments, MIL dimensions and related constructs in Study 1

	Factor	1	2	3	4	5	6	7	8
1	MIL judgments	-							
2	Significance	.65	-						
3	Purpose	.71	.49	-					
4	Coherence	.65	.48	.72	-				
5	Belonging	.54	.37	.45	.52	-			
6	Control	.56	.44	.39	.42	.44	-		
7	Self-liking	.63	.57	.52	.63	.59	.58	-	
8	Self-competence	.45	.38	.41	.57	.35	.48	.68	-

Note. All constructs are represented by latent factors. All correlations were significant at $p < .001$.

Therefore, we wanted to test whether the obtained items for significance, purpose, coherence and MIL judgments would not be explained better by a smaller number of factors. We ran a four-factor CFA on the meaning-related items. This model showed good fit: $\chi^2(97) = 179.97$, p < .001; CFI = .964; RMSEA = .054 (90% CI =.041 - .066); SRMR = .045. We conducted a nested-model comparison between this model and a one-factor model. The results show that the single-factor model fit the data significantly worse than the four-factor model, $\Delta\chi^2(6) = 618.30$, $p < .001$. The one-factor model also showed inadequate fit in absolute terms: $\chi^2(103) = 798.27$, $p < .001$; CFI = .70; RMSEA = .151 (90% CI =.141 - .160); SRMR = .103.

We then compared the four-factor model to all 6 three-factor models that could be created by collapsing any pair of factors into a single factor. Each of these three-factor models showed a significantly worse fit than the four-factor model—all $\Delta\chi^2(3) > 77.73$ and all ps < .001. Thus, despite being highly intercorrelated, significance, purpose, coherence, and MIL judgments are distinguishable constructs.

Structural equation model. Next, an initial structural model between the dimensions and MIL was tested. PANAS items were also included in the model to ensure that relationships are not explained by mood. A six-factor measurement model with significance, purpose coherence, MIL judgments, and positive and negative affect showed good fit: $\chi^2(579) = 1006.01$, $p < .001$; CFI = .924; RMSEA = .048 (90% CI =.043 -.053); SRMR = .053. Then, we modelled paths from each of the meaning dimensions and affect factors to the MIL judgments factor. The dimensions and affect factors were allowed to correlate (see Figure 3.1). As expected, there was a significant effect of sense of significance (β = .31, p < .001) and sense of purpose (β = .38, p < .001) on MIL. Interestingly, there was no significant direct effect of coherence on MIL (β = .15, p = .217). This model accounted for 66.3% of the variance in MIL judgments. These findings support the idea that purpose and significance have an effect on MIL judgments beyond what can be explained by mood. However, the unique relationship between coherence and MIL judgments seems less clear.
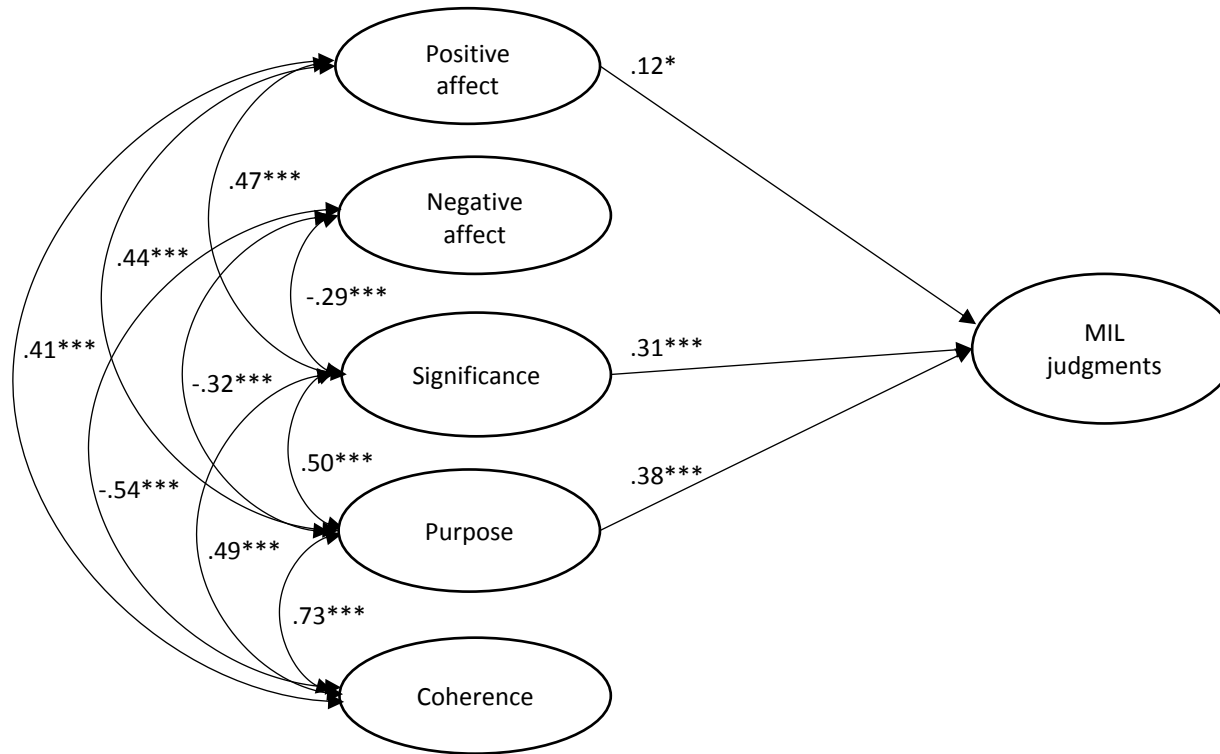
Figure 3.1. MIL judgments as an outcome of meaning dimensions and affect, in Study 1. Structural equation model with latent factors showing standardized estimates of correlations and paths from dimensions, and positive and negative affect to MIL judgments. Non-significant paths were not included in the figure. *p<.05, **p < .01, *** p <.001.

Discussion

We found evidence that the factors are separate from one another and from MIL judgments. Moreover, sense of significance, coherence and purpose were distinct from theoretically related predictors of meaning: self-liking, belongingness, control and self-competence. Finally, we found initial support for significance and purpose predicting MIL judgments. Interestingly, the path from sense of coherence to MIL was not significant. Nevertheless, because the data is correlational, we can only speculatively infer the direction of these relationships. To address this, Study 2 employed a longitudinal design.

Study 2

Study 2 aimed to clarify the directional relationships between the dimensions of meaning and MIL judgments. The meaning dimensions and MIL judgments scales developed in Study 1 were administered at three different time points to undergraduate students. There is a growing body of literature showing that MIL judgments can be susceptible to small short-term fluctuations (e.g., Heintzelman et al., 2013; Steger & Kashdan, 2013). However, if having a sense of meaningfulness is a product of reflective processes (i.e., deliberate, effortful processes; e.g., Martela & Steger, 2016), then the dimensions would be expected to exert their effects over a longer period of time. Consequently, we chose a time lag of a month. Firstly, we expected that all four constructs will remain moderately stable even across this longer timespan. Secondly, we expected that purpose and significance would predict MIL judgments a month later while controlling for earlier MIL scores. We also tested whether sense of coherence influences MIL judgments across time, but we made this prediction more tentatively given the null results from Study 1. Finally, we

expected that significance, purpose and coherence would be related to one another, but the direction of these relationships was less clear (George & Login, 2016a; Martela & Steger, 2016). A cross-lagged panel model with latent variables was used to test these predictions.

Method

      Participants and procedure. Participants were recruited among undergraduate students in exchange for research participation credits. The study was advertised as a longitudinal study with three waves, each one month apart. Students were given a link to the Qualtrics questionnaire and were asked to provide their email address in a separate survey, thereby allowing us to contact them anonymously for future waves. We allowed two weeks for data collection at Time 1 (T1), and one week at Time 2 (T2) and Time 3 (T3).

      Participants were asked to generate a unique identifying code so that their data could be matched across time points. We recorded 183 responses at T1. Out of these entries some were duplicates (i.e., matching identification codes). In these instances, the first entry was kept and the second entry was removed, unless the first entry contained little or no data (presumably, participants who quit the questionnaire almost immediately after accessing it and then came back to do it at a later time). Duplicates at T2 and T3 were handled in a similar manner. Moreover, when merging the datasets from different time points, some codes did not readily match. Where it was reasonable to assume that participants made a mistake in writing the code, the cases were matched manually. However, some cases could not be matched at all (codes were too different), and these cases were excluded from the final analysis. Figure 3.2 explains our exclusions at each step. Participants who dropped out at T2 and T3, respectively, did not significantly differ from those who completed all time

points. As in Study 1, missing data was handled using full maximum likelihood

estimation.
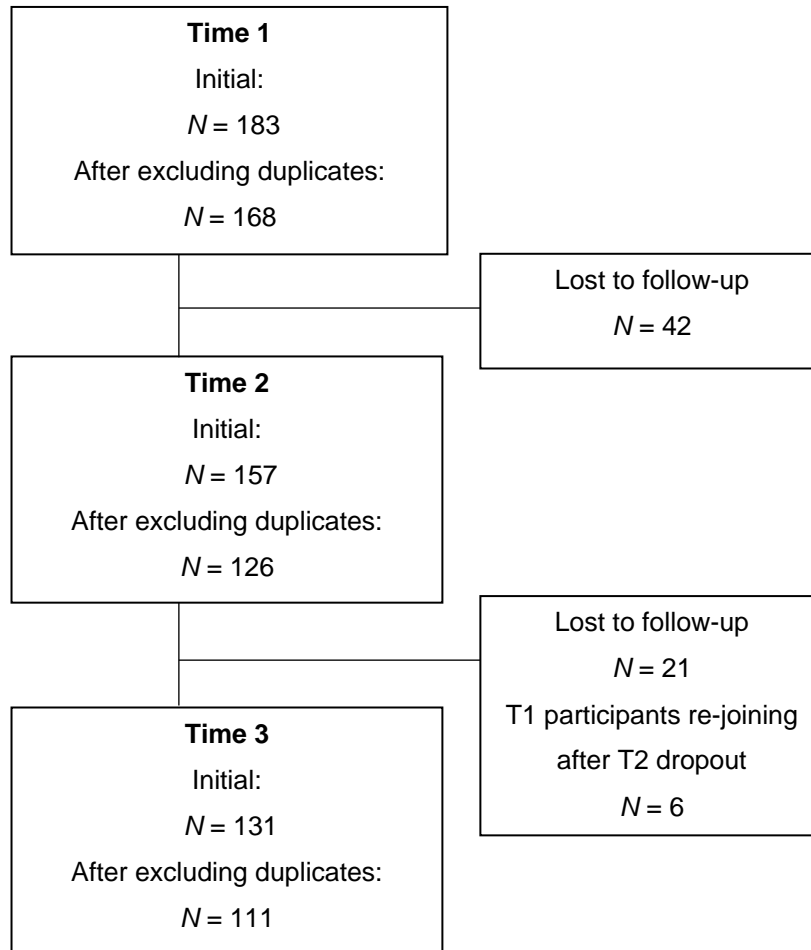
Figure 3.2: Explanation of exclusions at each time point in Study 2

The final T1 sample consisted of 168 participants (126 T2, and 111 at T3)

with a mean age of 19.78 ($SD = 4.90$) that ranged from 18 to 54. There were 131

females, 20 males, 2 participants who described themselves as "gender fluid" or

"non-binary", and 15 participants who did not report their gender. Most participants

reported being British nationals ($N = 131$), with the remainder coming from a mix of

nationalities. In terms of religious affiliation, most participants did not identify with

any religion ($N = 97$), followed by those who identified as Christian ($N = 42$),

Muslim ($N = 5$), and Jewish ($N = 5$).

As in Study 1, we were transparent about the purpose of our study,

introducing it as being about "how people experience their lives as having or not

having meaning across time". We measured MIL judgments first, followed by

dimensions of meaning presented in random order[9]. Demographics were collected at

the end of the questionnaire.

Measures. MIL, significance, purpose and coherence were measured using

the final selection of 24 items described in Study 1, using the same 7-point response

scale.

Results

Measurement invariance across time. Measurement invariance needs to be

established before running any structural equation modelling procedure on

longitudinal data; otherwise, the relationships observed might simply occur because

of the constructs naturally varying over time (Brown, 2015). For cross-lagged

models where we are interested in examining covariance relations, a minimum

requirement is to have *loading invariance* (i.e., when the loading of corresponding

indicators is the same at each time point; Little, Preacher, Selig, & Card, 2007). To

test this, we first created an unconstrained measurement model with 12 latent

variables: MIL judgments, significance, coherence and purpose at each of the three

time points. All latent factors were allowed to correlate with each other and error

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[9] Apart from the measures reported here, we also measured mood at all three time points
using the International PANAS Short Form (I-PANAS-SF; Thompson, 2007). Additionally, at T1, we
measured belief in freewill / determinism (FAD-Plus; Paulhus & Carey, 2001), religious belief (M. F.
Steger & Frazier, 2005), belief in a controlling God (Kay et al., 2008), meritocratic beliefs (based on
items from Zimmerman & Reyna, 2013), identification with family members and close friends
(Inclusion of Others in Self scale; Aron et al., 1992), social values (Short Schwartz's Value Survey;
Lindeman & Verkasalo, 2005), and national/ethnic/sexual identity (Postmes, Haslam, & Jans, 2013).
Results from these measures will be reported elsewhere.

terms for the same observed variables at different time points were also allowed to correlate. This model was then compared to a loading invariant model (the two models are nested). The ΔCFI statistic has been recommended as superior to the $\Delta\chi^2$ for testing measurement invariance, with ΔCFI value of .01 or smaller suggesting that the models are invariant (Cheung & Rensvold, 2002). We found that constraining the model did not substantially worsen the fit to the data, ΔCFI = .001. Therefore, we could assume *loading invariance* (Brown, 2015). This final model with constrained factor loadings had an acceptable fit, $\chi^2(984) = 1524.15$, p < .001; CFI = .905; RMSEA = .057 (90% CI =.051 -.063); SRMR = .063. Correlations between latent factors across time points can be seen in Table 3.3.

Table 3.3. Intercorrelations between MIL judgments, MIL dimensions and related constructs across all three time points in Study 2

	Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	MIL judgments T1	-											
2	MIL judgments T2	.83	-										
3	MIL judgments T3	.79	.92	-									
4	Significance T1	.74	.72	.67	-								
5	Significance T2	.85	.80	.73	.85	-							
6	Significance T3	.64	.64	.69	.79	.83	-						
7	Purpose T1	.52	.53	.55	.44	.45	.45	-					
8	Purpose T2	.57	.62	.61	.57	.52	.43	.81	-				
9	Purpose T3	.52	.54	.65	.51	.46	.55	.79	.85	-			
10	Coherence T1	.58	.57	.56	.53	.45	.48	.51	.49	.49	-		
11	Coherence T2	.63	.70	.64	.49	.51	.46	.52	.59	.55	.83	-	
12	Coherence T3	.59	.58	.62	.56	.54	.63	.50	.51	.55	.72	.78	-

Note. All correlations were significant at $p < .001$.

Cross-lagged longitudinal model. To model the relationships between constructs across time, we used a cross-lagged model (Finkel, 1995) with the four constructs as latent factors across the three time points. Having established loading invariance, item loadings in this model were constrained to be invariant over time. All auto-regressive and cross-lagged paths were included between constructs at different time points. This model was statistically equivalent to our measurement model and, consequently, had the same values on the global fit statistics. Before testing our main hypotheses, we tested some assumptions of the model. Firstly, we assumed that the relationship between T1 and T3 variables should be mainly explained through the T1-T2 and T2-T3 pathways. Indeed, removing all T1 to T3 paths did not produce a significantly worse-fitting model, $\Delta\chi^2(16) = 13.55$, $p = .632$. As such, the T1-T3 paths were not included in the final model. Secondly, we expected that the relationships between T1 and T2 variables would be the same as those between T2 and T3. However, constraining T1-T2 loadings to be equal to T2-T3 produced a model that was significantly worse, $\Delta\chi^2(16) = 30.57$, $p = .015$. Given that we could not assume similar T1-T2 and T2-T3 relationships between our variables, and considering the relatively low number of participants as compared to the number of items in our model, we decided to model T1-T2 and T2-T3 relations in two separate models.

In Model T1-T2, illustrated in Figure 3.3, all the constructs showed stability across time (autoregressive paths: βs = 56 - .75, ps < .001). In line with our prediction, T1 significance positively predicted T2 MIL ($\beta = .22$, $p = .029$). However, T1 purpose did not predict T2 MIL judgments ($\beta = .12$, $p = .101$). Moreover, sense of coherence did not go in the expected direction: T1 coherence did not significantly predict T2 MIL, but T2 coherence was predicted by T1 MIL

judgments (β = .30, p = .021). Additionally, T2 purpose was predicted by T1

significance (β = .22, p = .028).
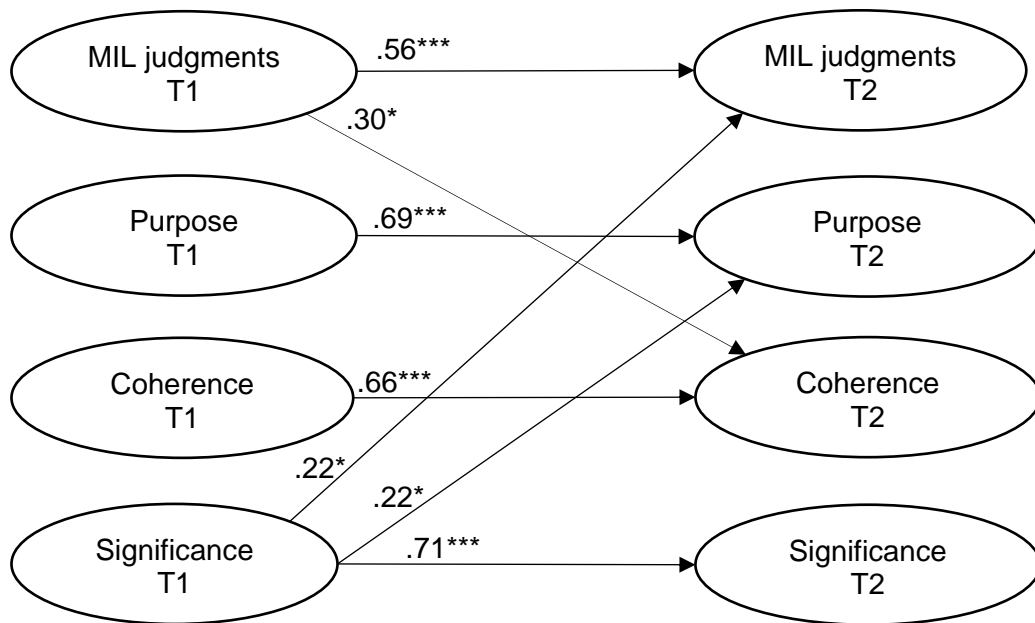
Figure 3.3. Relationships between MIL judgments and purpose, coherence and
significance at T1-T2, in Study 2. Cross-lagged model with latent factors showing
standardized estimates of paths between T1 and T2 MIL judgments, purpose, coherence
and significance, $\chi^2(429)$ = 757.24, p < .001; CFI = .914; RMSEA = .067 (90% CI =.060 -
.075); SRMR = .061. Correlations between latent factors are included in the model but not
displayed for ease of interpretation. Non-significant paths were not included in the figure.
p < .05, **p* < .01, *** *p* <.001.

In contrast, in Model T2-T3 (see Figure 3.4), no cross-lagged paths were

significant. However, this failure to capture substantive cross-lagged effects could be

due to the unusually large auto-regressive paths (βs = .72 - .91 *p*s < .001). In fact,

82.8% of the variance of T3 MIL judgments was explained by T2 MIL judgments.

This left almost no variance in T3 MIL to be explained by the other dimensions.
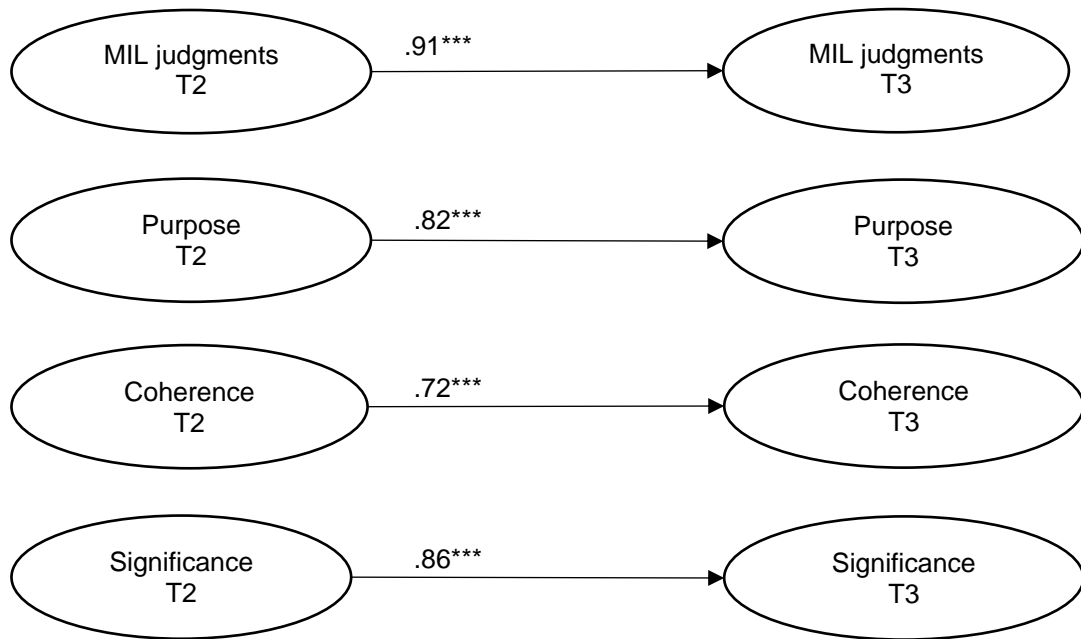
Figure 3.4. Relationships between MIL judgments and purpose, coherence and significance at T2-T3, in Study 2. Cross-lagged model with latent factors showing standardised estimates of paths between T2 and T3 MIL judgments, purpose, coherence and significance, $\chi^2(429) = 608.55$, p < .001; CFI = .942; RMSEA = .056 (90% CI =.046 -.066); SRMR = .061. Correlations between latent factors are included in the model but not displayed for ease of interpretation. Non-significant paths were not included in the figure. *p < .05, **p < .01, ***p <.001.

Discussion

Study 2 showed evidence that our items captured the same underlying constructs of MIL judgments, significance, purpose and coherence across time. Nevertheless, our main hypotheses were only partially supported. As expected, sense of significance predicted MIL judgments a month later. However, sense of purpose was not predictive of subsequent feelings of meaningfulness. Intriguingly, MIL judgments emerged as a precursor of coherence, which contradicts what would be expected according to tripartite accounts. However, this is aligned with Study 1 results showing coherence and subjective meaning as highly correlated despite having no directional path from coherence to MIL judgments, perhaps hinting at the possibility of an inverse directional relationship. Additionally, two dimensions were related to one another across time: sense of significance predicted having a sense of purpose a month later. It makes conceptual sense that feeling that one's life matters

would lead to being more committed to pursuing one's purpose (Martela & Steger, 2016) or to constructing and/or perceiving themes in one's goals.

The four constructs were stable across time, such that scores at one time highly predicted subsequent scores. However, it was intriguing that these stability paths were much stronger between the T2 and T3 than between T1 and T2. In fact, constructs were so stable between T2 and T3 that this raised concerns that no additional variance was left to be explained by the other factors. Indeed, this might be a key reason why we failed to model any substantive relationships between T2 and T3 factors. It could be that participants remembered their responses from T2 and attempted to give consistent responses at T3.

Study 2 had a relatively small sample size relative to the number of items included in the model. Moreover, the pattern of cross-lagged effects – although consistent with the correlational findings of Study 1 – was not predicted in advance. As such, we addressed this by running a pre-registered replication in Study 3, using a simplified design and a larger sample size.

Study 3

Study 3 aimed to replicate Study 2 findings by using a large, non-student sample. For ease of data collection, we included only two time points, administered again one month apart. We pre-registered Study 3 on AsPredicted.org where we committed to collect data from 500 participants at T1, hoping to retain at least 300 participants with complete T1-T2 responses. Based on Study 2 findings and consistent with original theorizing, we expected that: significance would predict MIL judgments (H1). We also predicted that MIL judgments would influence coherence (H2). More tentatively, we predicted that significance would influence purpose (H3). Based on Study 1 results as well as tripartite accounts, we also tested whether

purpose would influence MIL judgments (H4). Finally, because of our larger projected sample size, we aimed to test also whether the relationships would be moderated by key demographic factors: native language, religion, gender, relationship status, wealth and political orientation.

Method

Participants and procedure. We collected data from Prolific Academic (https://www.prolific.ac/) participants using a Qualtrics questionnaire. The study was advertised as a two-part longitudinal study about meaning in life where only participants who completed our questionnaire at T1 were invited to complete the T2 questionnaire. Participants were paid £0.35 for completing T1 (aprox. $0.45) and £0.65 upon completing T2 (aprox. $0.83). T2 participation had a higher financial incentive to reduce dropout rates.

Participants were asked to enter the unique identifying code (series of numbers and digits) generated by Prolific Academic. This is the default procedure for anonymously paying respondents. We used this code to match data across time points. We recorded 509 responses at T1 and 379 responses at T2 (130 were lost to follow-up). Participants who dropped out at T2 did not significantly differ from those who completed both time points. As specified in our pre-registration, we removed participants who failed to correctly respond to one or more of the 4 attention checks embedded within the questionnaire (e.g., "Please select somewhat agree") (64 cases removed). Additionally, 3 participants were excluded for not engaging with the questionnaire items: they gave the same response to all items on two or more scales. As in Study 1 and 2, missing data was handled using full maximum likelihood estimation.

The final sample at T1 consisted of 442 participants (326 at T2) aged between 18 and 70 ($M = 31.51$, $SD = 10.30$). Participants were 229 females and 205 males, as well as 8 participants who did not disclose their gender. The largest national group was British ($N = 127$), followed by US ($N = 86$) and Portuguese ($N = 42$), with the remaining 172 who answered this question coming from a mix of nations. Only 140 participants were in higher education. Most participants reported not belonging to any religious group ($N = 280$), and the second largest group was formed of Christians ($N = 129$), while other religious affiliations formed a small subset of our sample ($N = 25$). Finally, most participants were not in a relationship ($N = 156$), followed by those in a committed relationship ($N = 132$), then by those who are married ($N = 125$).

Our items were displayed following the sequence in Study 2: MIL judgment items, followed by meaning dimension items in randomised order, and finally demographics plus measures of relative wealth and political orientation.

Measures. We used the same measures of MIL, significance, purpose and coherence as in Studies 1 and 2. Relative wealth was measured by asking participants to mention their level of financial wealth, compared to other people in their country on a 7-point scale (1 = "Very poor", 4 = "Average wealth", 7 = "Very rich"). Political orientation was measured on an 11-point scale, 1 = "Left", 6 = "Centre", 11 = "Right").

Results

Measurement invariance across time. Following our procedure from Study 2, we first created a measurement model with 8 latent variables corresponding to MIL judgments, significance, purpose and coherence at the two time points, with the residuals of the same observed variables at each of the two time points allowed to

covary. Then, we tested loading invariance by comparing this initial model to a model where factor loadings were constrained to be the same across time. A nested-model comparison showed that the constrained model did not significantly worsen the fit to the data, ΔCFI $=$ .001. Consequently, we could assume loading invariance. The model with constrained factor loadings had a good fit, $\chi^2(429) = 946.423$, $p <$ .001; CFI = .951; RMSEA = .052 (90% CI =.048 -.057); SRMR = .048. Correlations between latent factors across time can be seen in Table 3.4.

Table 3.4. Intercorrelations between MIL judgments, MIL dimensions and related constructs across both time points in Study 3

	Factor	1	2	3	4	5	6	7	8
1	MIL judgments T1	-							
2	MIL judgments T2	.82	-						
3	Significance T1	.72	.70	-					
4	Significance T2	.67	.78	.85	-				
5	Purpose T1	.72	.63	.57	.47	-			
6	Purpose T2	.66	.67	.54	.53	.83	-		
7	Coherence T1	.70	.56	.44	.40	.65	.59	-	
8	Coherence T2	.65	.67	.51	.50	.65	.65	.82	-

Note. All correlations were significant at *p* <.001.

Cross-lagged longitudinal model. To test directional paths, we constructed an auto-regressive cross-lagged model corresponding to the loadings invariant measurement model described earlier (see Figure 3.5). As in Study 2, all auto-regressive paths and cross-lagged paths were included between constructs at different time points. The constructs showed stability across the two time points (autoregressive paths: βs = 64 - .78, *p*s < .001). Importantly, our main prediction (H1) was supported: T1 significance predicted higher T2 MIL judgments (β = .21, *p* < .001). However, against our predictions, T1 purpose did not predict T2 MIL

judgments ($\beta = .08$, $p = .193$) (H4), T1 MIL judgments did not predict T2 coherence ($\beta = -.06$, $p = .517$) (H2), and T1 significance did not predict T2 purpose ($\beta = .06$, $p = .316$) (H3). Finally, T2 coherence was positively predicted by T1 significance ($\beta = .16$, $p = .013$) and marginally positively predicted by T1 purpose ($\beta = .14$, $p = .053$).
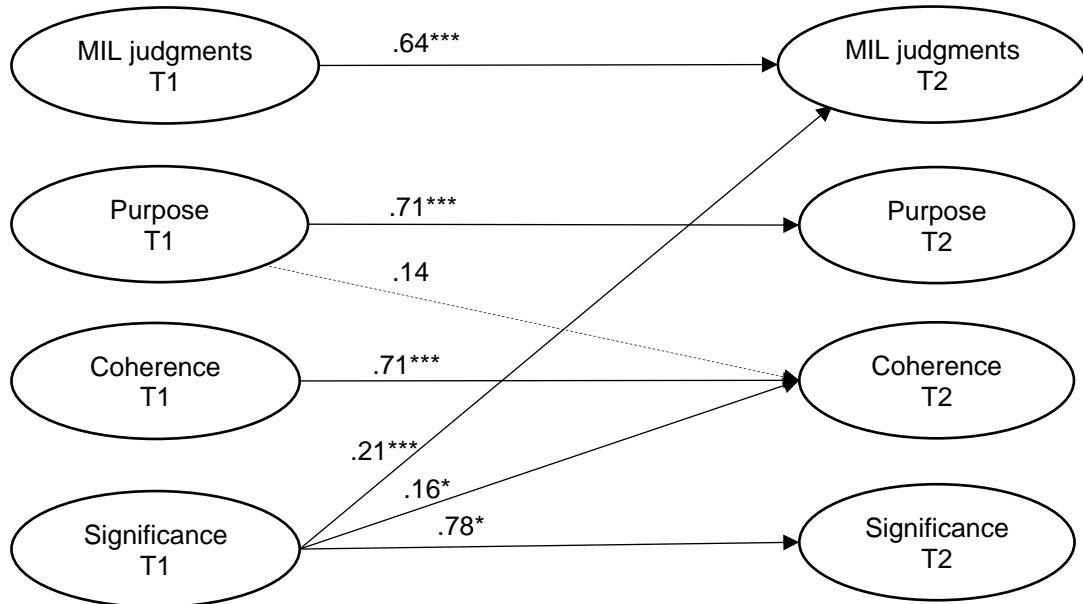
Figure 3.5: Relationships between MIL judgments and purpose, coherence and significance at T1-T2, in Study 3. Cross-lagged model with latent factors showing standardised estimates of paths between T1 and T2 MIL judgments, purpose, coherence and significance, χ^2 (429) = 946.423, p < .001; CFI = .951; RMSEA = .052 (90% CI =.048 -.057); SRMR = .048. Correlations between latent factors are included in the model but not displayed for ease of interpretation. Non-significant paths were not included in the figure. Solid lines show significant paths and dotted lines show marginally significant paths (p < .06). *$p < .05$, **$p<.01$, ***$p<.001$.

Moderators. We tested whether the pattern of results would differ according to participants' backgrounds. This was achieved by splitting the data on each of the suggested moderating factors. Then, we tested factorial invariance and performed multi-group comparisons on the split data.

First, we were concerned by the large numbers of participants coming from non-English-speaking countries. We tested whether the pattern of findings would be different when accounting for the language spoken by participants. Where available, we used data provided through Prolific Academic about participants' first language to split the sample into native English speakers (N = 198) and non-native English

speakers (N =190). First, we tested measurement invariance across the two groups.

Constraining factor loadings between native and non-native English speakers did not

substantially worsen the unconstrained model, ΔCFI = .001, additionally

constraining intercepts did not worsen the loading invariant model, ΔCFI = .001.

Thus, we could establish intercept invariance (Brown, 2015), which suggests that the

means of corresponding indicators across groups are comparable. There was no

difference between native and non-native English speakers in their latent factor

means (ps > .05). Then, we tested the structural model with constrained loadings and

intercepts between groups and showed that constraining the paths to be equal across

groups did not significantly worsen the model, $\Delta\chi^2(16) = 22.00$, p = .143. Therefore,

pattern of relationships did not differ by language proficiency.

Next, we tested the moderating effect of religious belief. Because few

religious participants in our sample were non-Christian, we simply split our sample

into non-religious and religious, with the latter category including participants from

all religions. We first established intercept invariance (ΔCFIs < .01). The final model

also showed good absolute fit: $\chi^2(892) = 1607.71, p < .001$; CFI = .930; RMSEA =

.061 (90% CI =.056 -.066); SRMR = .060. Then, we specified the structural model

(with constrained loadings and intercepts) and found that constraining paths to be

equal between religious and non-religious participants significantly worsened the

model: $\Delta\chi^2(16) = 36.35, p = .003$. As such, we looked at the pattern of relationships

for religious and non-religious people separately (see Figure 3.6). We also

constrained cross-lag paths one at a time and performed nested model comparisons

to test see what relationships were significantly different between groups. Religious

belief did not significantly moderate the relationship between T1 significance and T2

MIL judgments, $\Delta\chi^2(1) = 2.29, p = .130$, such that both religious and non-religious

participants relied on sense of significance to make MIL judgments (βs = .14-.35, ps < .021). However, religious belief significantly moderated the relationship from purpose to MIL judgments, $\Delta\chi^2(1) = 7.81$, $p = .005$, such that T1 purpose significantly positively predicted MIL judgments for non-religious participants ($\beta = .17$, $p = .021$), but not for religious participants ($\beta = -.18$, $p = .076$). Moreover, religious belief significantly moderated the path from coherence to MIL judgments, $\Delta\chi^2(1) = 6.77$, $p = .009$: T1 coherence significantly positively predicted T2 MIL judgments for religious participants ($\beta = .24$, $p = .047$), but not for non-religious participants ($\beta = -.13$, $p = .078$). Interestingly, T1 MIL judgments predicted T2 purpose for religious participants ($\beta = .45$, $p = .017$), but not for non-religious participants ($\beta = .01$, $p = .919$), and this difference was also statistically significant, $\Delta\chi^2(1) = 4.48$, $p = .034$.

Non-religious participants
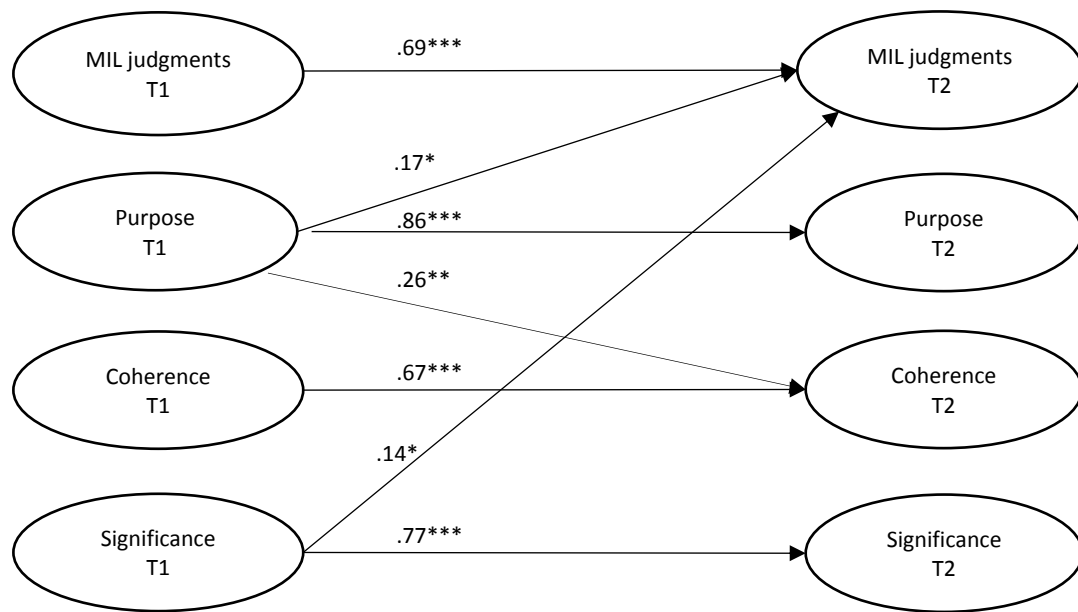
Religious participants
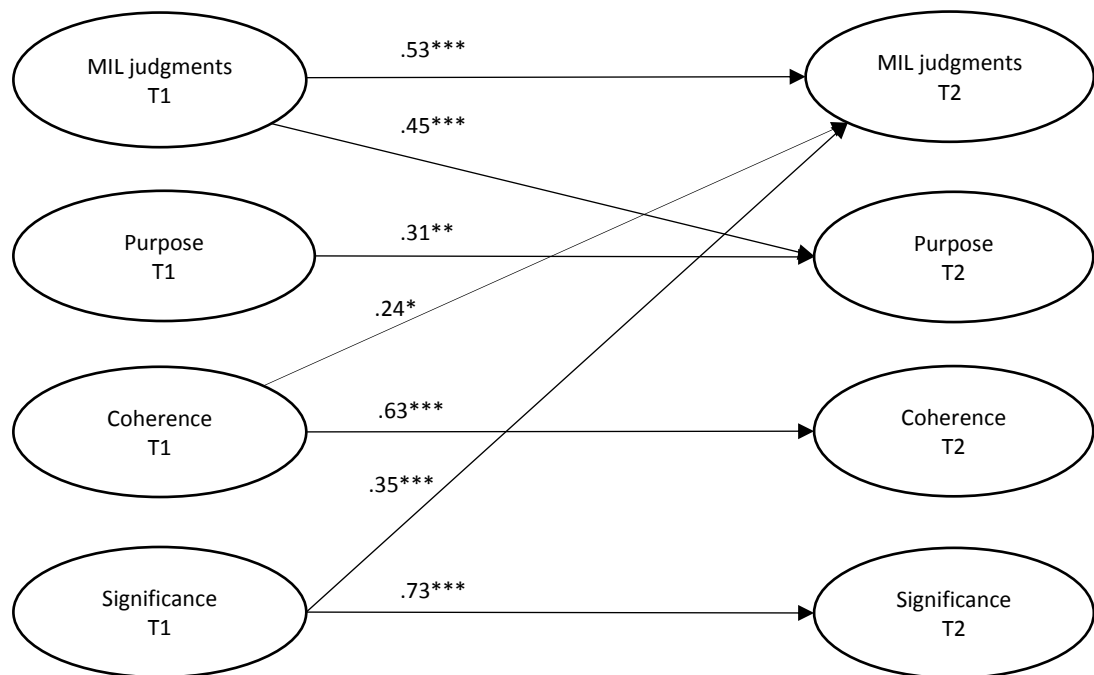
Figure 3.6: Relationships between MIL judgments and purpose, coherence and significance at T1-T2 for religious and non-religious participants, in Study 3. Cross-lagged model with latent factors showing standardised estimates of paths between T1 and T2 MIL judgments, purpose, coherence and significance for religious participants, in Study 3. Correlations between latent factors are included in the model but not displayed for ease of interpretation. Non-significant paths were not included in the figure. *p < .05, **p < .01, ***p <.001.

Latent factor means were compared between the two groups showing that religious participants scored significantly higher on all meaning constructs compared to the non-religious (ps < .010). However, given that all variances were also significantly higher for the religious group, we ruled out ceiling effects explaining the differential pattern of relationships.

A similar procedure was used for gender, relationship status, wealth and political orientation. Wealth was recoded into 3 categories: "Below average wealth" (Responses: 1-3, N = 130), "Average wealth" (Response: 4, N = 180), and "Above average" (Responses: 5-7, N = 124). Similarly, political orientation was recoded into 3 categories: "Left" (Responses: 1 to 4, N = 177), "Centre" (Responses: 5 to 7, N = 175), "Right" (Responses: 8 to 11, N = 82). For relationship status we only used "Not in a relationship", "Married" and "In a committed relationship" as very few participants reported having a different status (N =21). After establishing intercept invariance between different groups within each category (all ΔCFI < .01), constraining the paths to be equal in the corresponding structural models did not result in a significantly worse fit. Therefore, we can assume that the relationships do not differ according to gender, relationship status, wealth or political orientation.

Discussion

H1 was supported, showing that significance predicted MIL judgments one month later. This replicated the findings in Study 2, suggesting that significance is the most reliable of the three meaning dimensions at influencing MIL judgments. Unlike Study 2, coherence was not predicted by MIL judgments (H2 not supported). Nevertheless, we found that coherence was predicted by significance and, again, at each time point, coherence was correlated with concurrent MIL judgments. This suggests that sense of coherence might be a parallel construct to MIL judgments,

rather than a precursor. As in Study 2, purpose failed to predict MIL judgments (H4 not supported), despite the cross-sectional evidence in Study 1, suggesting a path from purpose to MIL. Significance did not predict purpose (H3 not supported). This would suggest that the interrelations between significance, purpose and coherence are more variable. Finally, we explored whether participants' backgrounds would influence the pattern of relationships. We ruled out the possibility that the pattern of findings might be different according to participants' native language, gender, relationship status, wealth and political orientation. However, our results suggested that non-religious participants rely on significance and purpose to make MIL judgments whereas religious participants rely on significance and coherence.

General Discussion

Leading a meaningful life is both intuitively appealing and empirically linked to measurable mental and physical benefits. However, there is still debate about what MIL is and how it should be defined and measured. It has been suggested that MIL is about purpose, coherence and significance. Across three studies, we aimed to test whether a person's MIL judgements (i.e., personal appraisals of life's meaningfulness), are informed by his or her sense of purpose, coherence, and significance. In Study 1, we found evidence that sense of significance, sense of purpose, sense of coherence, and sense of MIL are distinct dimensions that correlate with each other. We sought to extend George and Park's (2016b) finding that sense of significance, purpose and coherence had non-overlapping contributions to MIL judgements, by also ruling out two alternative explanations in terms of (a) acquiescent responding or (b) mood effects. Study 1 results only partially supported their findings – showing that significance and purpose, but not coherence, significantly contributed to a contemporaneous prediction of MIL.

Given that coherence, purpose and significance have been suggested as definitional components of MIL (George & Park, 2016, Martela & Steger, 2016), this should be reflected in people's appraisals of subjective meaningfulness. We recognise that seeing one's life as meaningful, and actually having a meaningful life are not the same thing, but MIL judgments are valuable as a subjective experience in their own right (Hicks & King, 2009a), and they might be informative about the "actual meaningfulness" of people's lives, if such a notion exists (Heintzelman & King, 2015). Of the three dimensions, significance emerged as the most robust predictor of MIL judgments across all our samples. Thus, when trying to decide whether their life is meaningful or not, people tend to ask whether their life matters in spite of their smallness in time (homo sapiens have existed for over 200,000 years, and the Universe has existed for more than 13.73 billion years) and space (the vastness of the Universe). This finding held across gender, wealth, political orientation, relationship status and religion. As such, there is initial evidence that the link to MIL judgments holds regardless of whether one's life is seen to matter in a spiritual sense (i.e., being God's creation) or in a secular sense (e.g., mattering to important others in one's life; O'Donnell et al., 2014).

The relationship between MIL judgments and either sense of coherence or sense of purpose was less straightforward. This was particularly surprising given that both coherence and purpose have been long associated with MIL, and in some cases, seen as coterminous with MIL (e.g., Antonovsky, 1987; Crumbaugh & Maholick, 1964). Across Studies 2-3, neither coherence nor purpose seemed to predict sense of MIL. Instead, sense of coherence was a significant outcome of MIL judgments in Study 2. In Study 3, coherence was predicted by significance and, marginally, by purpose, suggesting that sense of coherence might be a parallel outcome to sense of

MIL rather than a predictor. Similarly, purpose did not predict MIL judgments in Studies 2 and 3. However, these relationships were qualified by the moderating effect of religious belief.

For religious participants, sense of coherence predicted sense of MIL. In providing definitive answers about the nature of existence itself, religion establishes a *truth* (Kinnvall, 2004; Ysseldyk et al., 2010). Thus, religion tends to blur the lines between a subjective meaning *in* life and an absolute objective meaning *of* life. Consequently, sense of coherence might serve to affirm the broader tapestry of divine order thus heightening one's sense of meaning in (of) life. Alternatively, individual differences in the need "to cognitively structure their worlds in simple, unambiguous ways" (i.e., personal need for structure; Neuberg & Newsom, 1993; p. 114), and not religion, might be the key moderator. Various types of religiosity have been associated with having a high need for structure (Ladd, 2007). The same urge that makes worldviews such as religion appealing to certain people might also lead them to derive meaningfulness from order-affirming feelings such as sense of coherence.

Purpose predicted MIL judgments for non-religious but not for religious participants. Developing an overarching life aim might give a secular sense of meaningfulness to one's life through perceiving one's goals as related and unitary: "once a purpose becomes developed, purpose drives meaning" (McKnight & Kashdan, 2009, p. 243). Conversely, for religious people, purpose was preceded by feelings of MIL; this might follow from religion prescribing an absolute purpose: "meaning is embedded within religion's sacred character, so that it points to humanity's ultimate purpose" (Hood, Hill, & Spilka, 2009, p. 16).

Implications and Future Directions

Our paper is the first to test prospective relationships from the dimensions of significance, purpose, and coherence to MIL judgments, using a longitudinal design (Studies 2 and 3). While we found evidence for only one of the three dimensions of MIL (significance) uniformly informing MIL judgments across contexts, this does not disqualify purpose and coherence as components of MIL. Instead, some of our theoretical assumptions should be revisited.

MIL has been understood as both a product of both intuitive and reflective processes (King, 2012). Recent findings support the role of intuition in making MIL judgments (Heintzelman & King, 2016), and some have questioned to what extent people's sense of MIL reflects anything beyond "the general positive affect accompanying it" (Leontiev, 2013, p. 468). This paper aimed to determine the role of reflective processes (in the form of significance, purpose, and coherence), in the experience of MIL. Some have suggested that MIL-related reflective processing mainly serves to give the impression that one's existence is of value (Heintzelman & King, 2016). Our findings support this as significance emerged as the most reliable, context-independent predictor of MIL judgments. Nevertheless, in future studies, researchers should test whether the dimensions of MIL can be captured as intuitive judgments, perhaps through implicit measures of dimensions of MIL.

The finding that self-reported significance predicts self-reported MIL judgments could be read as tautological. People's lay definitions of meaningfulness and significance may overlap, which would explain the temporal sequence between the constructs. We consider this unlikely given that significance and MIL judgments emerged as separate, but correlated factors in Study 1, which was in line with our initial prediction.

Interestingly, we found evidence that paths to meaningfulness might not be wholly context-independent. We have shown that religious belief has a moderating effect. However, future studies should explore religion beyond the religious/non-religious dichotomy and aim to capture the multidimensional nature of religion, such as extrinsic and intrinsic orientations (Allport & Ross, 1967), and quest orientation (Altemeyer & Hunsberger, 1992; Batson & Ventis, 1982). This might be particularly relevant as different religious orientations have different associations with structure-seeking tendencies (Ladd, 2007). Furthermore, exploring moderators might be particularly relevant in relation to the coherence-MIL judgments relationship, given that coherence has been shown to either be predicted by (Study 2, across the sample), predict (Study 3, for religious participants), or be a parallel outcome to MIL judgments (Study 3, for non-religious participants).

Findings should also be interpreted in light of the time lag used across our studies. Despite making a theoretically-informed time lag choice, there are no previous studies suggesting over what span of time purpose, coherence and significance inform MIL judgments. If this process occurs over a shorter or a longer span than the one month lag chosen for Studies 2 and 3, our design would underestimate these relationships (Taris & Kompier, 2014). Moreover, it is possible that significance, coherence and purpose exert their influence on MIL judgments over different periods of time. Future research should aim to test this, using differently spaced measurement points.

Conclusions

The current paper shows evidence that MIL judgments are not reducible to significance, purpose and coherence. Two theoretically-established, reflective, meaning-related constructs, coherence and purpose, seemed to have a complicated

relationship to forming MIL judgments that seems contingent on religious belief. In contrast, sense of significance plays a more generalizable role in making MIL judgments. People who feel that their lives matter tend to feel that their lives are more meaningful and previous research has shown that a meaningful life is a healthy, happy life.

PAPER 4: Meaning frameworks and meaning in life: Why are some worldviews,

identities, and attitudes more meaningful than others.

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Reference:

Costin, V., & Vignoles, V. L. (2017). *Meaning frameworks and meaning in life: Why are some worldviews, identities, and attitudes more meaningful than others.* Manuscript in preparation.

Abstract

Research into people's sense of meaning in life (MIL) has tended to focus on either contents that people may find meaningful (e.g., religious beliefs, relationships, values, etc.) or dimensions that may contribute to a sense of meaningfulness (e.g., sense of purpose, significance, or coherence). Bringing these two research foci together for the first time, allows us to understand the functions that various beliefs, values, identities and attitudes serve in fulfilling a sense of MIL. We aimed to test whether *meaning frameworks* (i.e., systems of relationships used to make sense of the world; e.g., worldviews, identities, attitudes) associated with higher sense of purpose, significance and coherence are also associated with higher *MIL judgments* (i.e., abstract appraisals that one's life is meaningful). In turn, we expected that MIL judgments are linked to the perceived importance of the meaning framework. The effects of individual-level moderators were also explored. Using multilevel structural equation modelling (Level 1 with meaning framework ratings, and Level 2 with individual-level differences in meaning framework content), within-person ratings of significance, purpose and coherence predicted MIL judgments which, in turn, predicted perceived importance. These findings suggest that meaning frameworks satisfy feelings of MIL not just through coherence but also through significance and purpose, with implications for the threat compensation literature.

Introduction

Issues concerning meaning have occupied people's imaginations for thousands of years (e.g., Aristotle, c.350BCE/1962), sometimes with paralysing intensity: "As long as I do not know the reason why, I cannot do anything" (Tolstoy, 1957/1983, p.27). In a more mundane form, when people ask themselves whether a job, or activity, or relationship is worthwhile, people are ultimately asking: *How can I lead a "good" life?* Seeking positive, moral and worthwhile pursuits beyond momentary pleasures is, at a minimum, desirable, and, in more extreme cases, "a matter of life and death" (Yalom, 1980, p. 419).

Despite increased interest in meaning within psychology (e.g., Leontiev, 2013), there has been a persistent lack of consensus as to how the construct should be defined and operationalised (Hicks & King, 2009a; Leontiev, 2013). At times, the term "meaning" has been used to describe how people make sense of themselves and their environment, and it has been studied under conditions of threat (e.g., Heine et al., 2006). Other research has focused on the positive effects of having *meaning in life (MIL)*, which range from better physical and mental health (Brassai et al., 2015; Steger et al., 2009; Zika & Chamberlain, 1992) to increased longevity (Boyle et al., 2009; Hill & Turiano, 2014). MIL either has been used synonymously with the subjective, abstract appraisals made by people regarding whether their life is meaningful, or has been seen as a multi-faceted construct (e.g., George & Park, 2016a; Martela & Steger, 2016; Reker & Wong, 1988; Schnell, 2009). In what follows, we aim to bridge these research strands and test the link people's sense-making frameworks to MIL.

Defining and Measuring Meaningfulness

Recent theoretical accounts of MIL define it in terms of three facets: purpose, significance and coherence (George & Park, 2016a; Martela & Steger, 2016b), henceforth called *dimensions of MIL*. Sense of purpose is a motivational construct that acts as an overarching life aim which subsumes and organises other goals (McKnight & Kashdan, 2009). Sense of coherence involves "making sense of one's experiences in life" (Reker & Wong, 1988, p. 220). Finally, sense of significance consists of an evaluation that one's life matters (George & Park, 2014; George & Park 2016a). Furthermore, initial studies suggest that these constructs are distinct from one another, and each has been shown to correlate with theoretically-related constructs (George & Park, 2016b; see Paper 3).

Nevertheless, it is unclear how such definitions of MIL relate to people's subjective appraisals of how meaningful their lives are (also known as *MIL judgments*; George & Park 2016a). MIL is an abstract construct which might also involve an objective component (e.g., Wolf, 2010). By extension, meaningful lives might, in principle, be distinctly identified by external observers using some form of criteria (Martela, 2017). In contrast, MIL judgments (or sense of meaningfulness) refer specifically to the subjective appraisals made by individuals about their own lives. MIL judgments have often been implicitly equated with MIL: the most widely used measure of MIL includes items such as "I have a good sense of what makes my life meaningful" (Meaning in Life Questionnaire – Presence subscale; Steger et al., 2006). Regardless of whether MIL can be reduced to MIL judgments, feeling that life is meaningful should be at least partially indicative of how meaningful life is (see Heintzelman & King, 2014a). Consequently, if MIL is defined as purpose, significance and coherence, then *feeling* that one's life has purpose significance and

coherence should also lead to *feeling* MIL. It is still unclear under what circumstances each of the three dimensions (particularly purpose and coherence) lead one to judge life as meaningful (see Paper 3).

The Relation Between Meaning Frameworks and MIL

Another prominent strand of research has used the term *meaning* to denote sense-making, involving the construction and use of *meaning frameworks* (or mental representations; Heine et al., 2006; Proulx & Heine, 2010). Meaning frameworks broadly refer to "expected relationships" used to make sense of the world (Proulx & Inzlicht, 2012, p. 317). They form a broad construct that encompasses both single propositions (e.g. grass is green) and clusters of propositions (e.g. identities; George & Park, 2016a).

Meaning frameworks have been frequently studied in relation to threat (Proulx & Heine, 2006, 2008, 2009), alongside work on threat compensation where people respond to violations of expectation in one life domain by affirming an alternative domain (e.g., Hogg, 2000; Steele, 1988). Consequently, this work has been criticised for only explaining what happens when meaning is lacking, but not accounting for the positive experience of having MIL (Steger, 2012b).

There have been indirect attempts to link meaning frameworks to MIL judgments, through their presumed coherence-affirming properties (Heintzelman & King, 2014a; Heintzelman et al., 2013). Nevertheless, it is unclear to what extent different meaning frameworks with varying complexity and content are of differential use in providing a sense of MIL. Apart from their obvious coherence-related functions, meaning frameworks can also be evaluative (e.g., attitudes), or prescriptive or proscriptive (e.g., values; Koltko-Rivera, 2004), suggesting they could also be related to significance and purpose (framed as evaluative and

motivational components, respectively; Martela & Steger, 2016). Indeed, it has been proposed recently, but not tested, that meaning frameworks are related to MIL to the extent that they elicit a higher sense of significance, purpose and coherence (George & Park, 2016a). Testing this proposition is a central goal of our current study.

So far, the term *meaning frameworks* has been used to describe a wide range of psychological constructs (e.g., schemata, beliefs) as they have been shown to serve similar needs for consistency (e.g., Heine et al., 2006). Regardless, not all of these meaning frameworks have the same potential to elicit meaningfulness. For instance, successfully identifying a piece of furniture as a "chair" might not make one's life more meaningful, but believing that people have free will might (Bergner & Ramon, 2013; Crescioni, Baumeister, Ainsworth, Ent, & Lambert, 2015). Highly complex meaning frameworks such as those related to free will have been called *worldviews,* defined as "beliefs regarding the underlying nature of reality, 'proper' social relations or guidelines for living, or the existence or nonexistence of important entities" (Koltko-Rivera, 2004, p. 5). These belief systems are either arrived at through abstraction from personal experience or culturally prescribed. Worldviews orient individuals to what is worth knowing and to how knowledge can be obtained, thus occupying a superordinate position in cognition (Koltko-Rivera, 2004; Nisbett, Peng, Choi, & Norenzayan, 2001). Consequently, to the extent that MIL is a product of reflection and information integration (Martela & Steger, 2016), then worldviews should be highly important for MIL.

Other complex meaning frameworks include attitudes, which are evaluative structures, perhaps operating downstream from worldviews (e.g., Van Hiel, Cornelis, & Roets, 2007). Furthermore, identities might be similar to worldviews in their central relationship to MIL (Vignoles, 2011). Identities serve to make sense of both

personal and social self-relevant information (Vignoles, in press.) and variations in

self-construal are linked, in turn, to differences in cognitive and affective processes,

as well as in behaviour (reviewed by Cross, Hardin, & Gercek-Swing, 2011).

Even when complexity and type of information (self-relevant, evaluative etc.)

are taken into account, meaning frameworks can still differ in important ways. For

instance, believing in free will, as opposed to determinism, is associated with higher

MIL judgments (Bergner & Ramon, 2013), despite both free will and determinism

addressing the same issue and being equally complex. People might also draw on

different sources of information to judge MIL, depending on their endorsed meaning

framework (e.g., religious versus non-religious people; see Paper 3).

Finally, if feeling meaningfulness is a highly desirable experience (Steger et

al., 2008), then meaning frameworks associated with a higher sense of MIL may be

perceived as being more important. Furthermore, if MIL judgments reflect MIL in a

way that is not reducible to other psychological states, then sense of MIL is expected

to predict meaning framework importance even while controlling for other important

psychological needs, such as identity motives (Vignoles, 2011) or need for control

(Galinsky, Whitson, Huang, & Rucker, 2012).

Current Study

Whereas previous studies have focused on measuring and predicting

individual differences in MIL judgments (see Paper 3; George & Park, 2016b; Steger

et al., 2006), here we focused on intrapersonal variation across different worldviews,

attitudes and identities—i.e., rather than predicting which individuals perceive their

life as more meaningful compared to other individuals, we sought to predict which of

people's meaning frameworks they perceive as more meaningful compared to other

frameworks. Participants selected (or formulated) statements reflecting their

identities, beliefs, attitudes or values in each of the following 12 domains: national

identity, religious identity, role identities in relation to two important others, family

identity, socioeconomic beliefs, free will/determinism beliefs, beliefs about human

nature, abortion attitudes, death penalty attitudes, personal values and moral

foundations. A participants' responses for each of the 12 domains are henceforth

referred to as a participants' *meaning frameworks*. Meaning-related measures were

modelled as within-person variation across the various meaning frameworks

identified. Capturing diverse meaning frameworks was essential to ensure variation

in ratings of MIL judgments and the three dimensions of meaning. Consequently,

domains were selected to vary in the type and complexity of the meaning

frameworks they were meant to elicit (e.g., worldviews, attitudes). Each meaning

system was rated for meaningfulness, purpose, significance and coherence.

Participants also rated the perceived importance of each meaning framework, and to

what extent it fulfilled psychological needs of belongingness, self-esteem, self-

efficacy, distinctiveness, continuity and personal control.

  We predicted that participants would derive a stronger sense of

meaningfulness from those meaning frameworks that made them feel a stronger

sense of purpose, significance and coherence. Furthermore, we expected that MIL

judgments would predict the importance of one's meaning frameworks, even while

controlling for fulfilment of other important psychological needs. This within-person

technique has some important advantages above the widespread practice of using

self-report measures of MIL at the individual level. By using ratings of multiple

meaning frameworks, people do not directly judge the level of meaningfulness of

their lives as a whole, which might insulate our results from socially desirable

response style, especially as participants would not necessarily be aware of the

statistical patterns within their data that formed the focus of our analyses. Moreover, a statistical focus on within-person variation insulates our results from acquiescent response style, and it provides information about the associations between MIL and other constructs for each individual in the sample, whereas an individual-differences approach would only allow us to explore these associations across the sample as a whole.

A second aim was to explore the moderating effect of individual-level variables derived from people's meaning framework content—i.e., we sought to explore how individuals differ in what meaning frameworks they perceive as more meaningful compared to others. We attempted to replicate previous findings that religious orientation would moderate the relationship between purpose and MIL judgments and between coherence and MIL judgments (see Paper 3), while differentiating between atheists and agnostics. Agnostics stand out from religious people and atheists as they display a "lack of either belief or disbelief in God" (Hood et al., 2009, p. 132), suggesting that agnostics should be treated as a separate category, rather than a "mid-point" between religiosity and atheism.

More speculatively, we explored whether those who believe in free will form MIL judgments differently to those who believe in determinism. Also, we looked at people's beliefs about human nature in terms of whether they saw people as more bad-natured as opposed to good-natured (e.g., Koltko-Rivera, 2004). Furthermore, given that relationships with others have been linked to MIL judgments (Krause, 2007; Lambert et al., 2013; Steger et al., 2013; for a review see O'Donnell et al., 2014), we also tested differences between those who pursue life-guiding principles (or personal values; Schwartz, 1992) that have a social focus as opposed to a personal focus (Schwartz et al., 2012). Similarly, we explored differences between

those who made moral judgments based on *individualizing foundations,* where the individual is the locus of morality (foundations of Harm/care and Fairness/reciprocity), as opposed to *binding foundations*, where the group is the fundamental source of morality (foundations of Ingroup/loyalty, Authority/respect and Purity/sanctity; Graham, Haidt, & Nosek, 2009; Haidt, 2008). Finally, given the motivational dimension of purpose (e.g. Martela & Steger, 2016), we also compared those who preferred values that had a growth focus to those who selected self-protective values (Schwartz et al., 2012).

Method

Participants

We collected data from MTurk (https://www.mturk.com) US participants using an online survey created using Qualtrics (https://www.qualtrics.com/). The study was advertised as a study of 20-30 minutes about beliefs and worldviews. Participants were paid $1 for completing the questionnaire.

Because most incomplete responses did not include any meaning framework ratings, we decided to include only complete response sets in our analysis. Therefore, of 408 participants who accessed our questionnaire, we initially retained 372 complete cases. Out of these, a further 164 participants were removed who failed to respond correctly to one or more of the three attention checks embedded within the questionnaire (e.g., "Please select somewhat disagree"); their attention check failure was interpreted as indicating non-engagement with the task[10].

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[10] We compared the scores of participants who were excluded based on attention check failures to those retained in the final sample. Across all meaning frameworks, ratings of MIL, purpose, coherence, and significance were significantly higher for those who failed the attention checks (*M*s between 5.19 and 5.32, *SD*s between 1.59 and 1.64) compared to those who did not (*M*s between 4.76 and 4.96, *SD*s between 1.77 and 1.85). However, we obtained the same pattern of within-person relationships regardless of exclusions.

The final sample consisted of complete responses from 208 North American participants: 108 females, 98 males and 2 self-identified as "gender queer". Ages ranged from 20 to 74 ($M = 38.46$, $SD = 13.22$). Most participants were Christian ($N = 92$), followed by atheists ($N = 51$) and agnostics ($N = 43$), with the other 22 participants identifying as Jewish, Muslim, Buddhist or "other" (with entries such as "spiritual, but not religious", "mormon" etc.). Most participants were in full-time employment ($N = 120$), followed by part-time or self-employed ($N = 50$), with the remaining participants either in education ($N = 24$), or retired/unemployed ($N = 14$). Finally, most participants were married ($N = 81$), followed by those not in a relationship ($N = 71$), then by those in a committed relationship ($N = 39$).

Questionnaire and Procedure

The questionnaire (see Appendix 4) comprised two sections. First, we collected information to determine participants' meaning frameworks in relation to the 12 domains of: national identity, religious identity, role identities in relation to two important others, family identity, socioeconomic beliefs, free will/determinism beliefs, beliefs about human nature, abortion attitudes, death penalty attitudes, personal values and moral foundations. Then, the elicited meaning frameworks were displayed one at a time, in a randomised order. Participants were asked to rate each of them on several aspects.

Eliciting meaning frameworks. Participants first completed demographic information, which included questions about their religious belief and their nationality. Afterwards, participants were presented with a statement-choosing task intended to identify their beliefs, values and identities. Participants were shown domain names one at a time, in a random order, followed by the instruction to select a statement that reflected their position on the respective domain. For most domains,

participants were given the option to select "Other" and write their own statement in relation to the domain. Table 4.1 illustrates the statements displayed for each domain. Then, participants were asked to specify their role for two important people in their lives, in the format "I am [name of person]'s [role in relation to the other person]" (e.g., "I am Sam's mother"). Finally, family identity was not defined by participants (e.g., by providing a family name) in order to maintain anonymity. Family identity was simply referred to later using the phrase "Being a member of my family".

Meaning framework ratings. Each of the 12 participant-specific meaning frameworks was rated separately. Participants' saw each of their meaning frameworks (presented in random order) displayed at the top of the screen, followed by a series of questions. We first measured perceived importance, using an attitude importance measure, "How important is this to you personally?" (Skitka, Bauman, & Sargis, 2005), with responses given on a 5-point scale (1 = "Not at all important", 5 = "Extremely important"). Participants then selected to what extent each meaning framework gave them a sense of MIL ("Believing that / Valuing / Being [meaning framework] makes me feel a sense of meaningfulness in my life").

Table 4.1. Meaning framework domains and corresponding response options

Domain	Response options	Theoretical bases
Free will / determinism beliefs	One has complete control over the decisions one makes; one can overtake any obstacles if they truly want to One could have free will even if scientists discovered all of the laws that govern all human behaviour Every event that has ever occurred, including human decisions and actions, was completely determined by prior events Life is hard to predict because it is almost totally random; what happens to people is a matter of chance Fate determines one's successes and failures Other	Free will scales (Nadelhoffer, Shepard, Nahmias, Sripada, & Ross, 2014; Paulhus & Carey, 2011); Social Axioms Survey, SAS II – Fate Control scale (Leung et al., 2012)
Beliefs about human nature	Powerful people tend to exploit others The only way to get ahead is to take advantage of others People are inherently generous and kind-hearted Most people mean well and can be trusted Other	Social Axioms Survey, SAS II - Social Cynicism scale (Leung et al., 2012)
Socioeconomic beliefs	It's probably a good thing that certain groups are at the top and other groups are at the bottom We would have fewer problems if we treated different groups more equally Success depends more on the circumstances into which one is born than hard work By working hard one can overcome most obstacles that life presents and make his or her own way in the world Other	Social Dominance Orientation (Jost & Thompson, 2000); beliefs in meritocracy (Zimmerman & Reyna, 2013)
Abortion attitudes	Abortion should be legal and readily accessible to people requesting it To protect the rights of the unborn baby, legal abortion should never be available Abortion should only be allowed only in case of rape, incest, or life-threatening situations Other	Adapted from items used in McGregor et al. (2001)
Death penalty attitudes	A murderer deserves to die Capital punishment is absolutely never justified	Adapted from items used in McGregor et al. (2001)

	Capital punishment is necessary for some crimes Other	
Personal values	POWER (social power, authority, wealth) ACHIEVEMENT (success, capability, ambition, influence on people and events) HEDONISM (gratification of desires, enjoyment in life, self-indulgence) STIMULATION (daring, a varied and challenging life, an exciting life) SELF-DIRECTION (creativity, freedom, curiosity, independence, choosing one's own goals) UNIVERSALISM (broad-mindedness, beauty of nature and arts, social justice, a world at peace, equality, wisdom, unity with nature, environmental protection) BENEVOLENCE (helpfulness, honesty, forgiveness, loyalty, responsibility) TRADITION (respect for tradition, humbleness, accepting one's portion in life, devotion, modesty) CONFORMITY (obedience, honoring parents and elders, self-discipline, politeness) SECURITY (national security, family security, social order, cleanliness, reciprocation of favors)	Response options from the Short Schwartz Value Survey (SSVS; Lindeman & Verkasalo, 2005); based on Schwartz's (1992) Value Theory
Moral foundations	One should avoid causing physical or emotional harm to others One should not treat some people differently than others; all people's rights need to be respected and they should be treated fairly One should be loyal and place the interests of the group above one's own One should fulfil his or her duties and show respect for legitimate authorities Traditions should be upheld as they serve important roles within one's community When one makes moral judgments, one must also consider whether things rise to standards of purity and decency	Response items adapted from Graham et al., 2009; based on Moral Foundations Theory (Haidt & Joseph, 2004)

Note. For the option *Other,* participants wrote their own statement in relation to the specified domain

Creating individual-level variables. At the analysis stage, from participants' chosen meaning frameworks within a domain, we created seven categorical variables indicative of individual-level differences. Religious orientation differentiated between atheists ($N = 51$), agnostics ($N = 43$), and all other religious denominations (including some of the responses from the "Other" category[11]; $N = 114$). Free will belief differentiated between those who held free will beliefs (endorsing statements such as "One could have free will even if scientists discovered all the laws that govern all human behaviour"; $N = 123$) and all other (beliefs in fate, randomness etc.; $N = 85$). Moral foundation preference differentiated between those who held individualizing foundations (Harm/care, Fairness/reciprocity; $N = 172$) from those who held binding foundations (Ingroup/loyalty, Authority/respect and Purity/sanctity; $N = 36$; Haidt, 2008).

From preferred personal values, we created a growth versus self-protection focus variable (Schwartz et al., 2012) which differentiated between those who selected values of benevolence, universalism, self-direction, stimulation or hedonism (growth focus, $N = 172$) to those who selected values of conformity, security, tradition and power (self-protection focus, $N = 21$). Using the same personal value preferences, we also created a social versus personal focus variable (Schwartz et al., 2012) that contrasted those who selected values of universalism, benevolence, conformity and tradition (social focus, $N = 98$) to those who selected values of self-

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[11] Responses from the "Other" category were judged on a case-by-case basis. Entries were included in the religious category if they specified a religious denomination already included in the response options (e.g., catholic, orthodox) or other entries such as "mormon" or "pagan". In contrast, entries such as "spiritual" were excluded from comparisons based on religious orientation. Similarly, those who wrote "none" were excluded as it was unclear whether they should be included in the atheist or agnostic category.

direction, stimulation, hedonism, achievement and power (personal focus, $N =$ 101).[12]

Results

Analytical Approach and Preliminary Analyses

Multilevel analyses were performed using MPlus Version 6 (Muthén & Muthén, 2010). All models were estimated using full maximum likelihood. Given the nested data structure, we tested predictions of within-person variance in MIL judgments using a multilevel regression analysis (Hox, 2002). Level 1 units were meaning framework categories ($N = 2495$) and Level 2 units were individuals ($N = 208$).

Firstly, we tested whether MIL ratings varied by type of meaning framework that participants had to rate at Level 1, i.e., values (personal values, moral foundations), identities (identity roles to two important others, family identity, national identity, religious identity), belief (socioeconomic beliefs, free will/ determinism beliefs, beliefs about human nature), or attitudes (abortion attitudes, death penalty attitudes). We created dummy coded regression coefficients for the meaning framework types with attitudes as the reference category. We found that MIL ratings, compared to attitudes, were significantly higher for values ($\beta = .08$, $p < .001$, 95% CI [.05, .12]) and identities ($\beta = .08$, $p < .001$, 95% CI [.04, .11]), but not beliefs ($\beta = .03$, $p = .118$, 95% CI [-.01, .06]).

Meaning Dimensions Predicting Meaningfulness of Meaning Frameworks

At Level 1, we created dummy coded regression coefficients for the meaning framework categories. The reference domain was "Death penalty"; this was chosen

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[12] Due to being on the border between two types of value focus, those who selected the value of achievement were not included in the analysis comparing growth versus self-protection focus. Similarly, those who selected the value of security were excluded from the analysis comparing social versus personal focus.

as it had the lowest self-reported MIL score ($M = 3.69$). These dummy coded

variables were included in all models to control for the systematic (i.e., shared across

participants) variation in MIL judgment scores across the different meaning

framework domains. The standardised path coefficients from the dummy coded

meaning framework domains to MIL ratings are displayed in Table 4.2.

Table 4.2. Standardised paths from the dummy coded meaning framework categories to MIL judgments in the within-participants model; means and standard deviations for MIL judgments

Domain	Regression coefficients for MIL judgments			Means (SDs)			
	β [95% CI]	SE	*p*	MIL judgments	Purpose	Significance	Coherence
Role to important other 1	.09 [.06, .12]	.02	< .001	5.94 (1.38)	5.74 (1.36)	5.64 (1.46)	5.82 (1.27)
Personal values	.07 [.04,.10]	.02	< .001	5.87 (1.30)	5.90 (1.18)	5.53 (1.49)	5.86 (1.20)
Role to important other 2	.09 [.06,.13]	.02	< .001	5.79 (1.31)	5.52 (1.42)	5.51 (1.48)	5.57 (1.34)
Family identity	.06 [.03, .09]	.02	.001	5.51 (1.72)	5.38 (1.78)	5.41 (1.81)	5.51 (1.76)
Moral foundations	.08 [.05, .12]	.02	< .001	5.49 (1.35)	5.24 (1.45)	5.07 (1.60)	5.39 (1.35)
Socioeconomic beliefs	.05[.01, .08]	.02	.006	5.20 (1.56)	5.18 (1.56)	4.99 (1.69)	5.17 (1.59)
Free will/ determinism beliefs	.03 [.00, .06]	.02	.069	4.84 (1.73)	4.78 (1.80)	4.71 (1.82)	4.85 (1.83)
Religious identity	.03 [-.01, .06]	.02	.170	4.77 (1.81)	4.70 (1.91)	4.65 (2.01)	4.89 (1.83)
National identity	.02 [-.01, .05]	.02	.208	4.47 (1.78)	4.35 (1.78)	4.24 (1.83)	4.63 (1.79)
Abortion attitudes	.01 [-.02, .04]	.02	.418	4.01 (1.66)	3.77 (1.67)	3.94 (1.78)	3.97 (1.72)
Beliefs about human nature	.01 [-.02, .04]	.02	.721	3.92 (1.78)	3.76 (1.80)	3.77 (1.86)	3.91 (1.83)
Death penalty attitudes	-	-	-	3.69 (1.72)	3.34 (1.61)	3.69 (1.78)	3.80 (1.77)

Note. Reference meaning framework domain is Death penalty. Meaning frameworks in descending order of MIL judgments means

Intercorrelations between significance, purpose, coherence and MIL ratings were high (.74 to .83). Nevertheless, when partialling out the effect of meaning framework domain, the residual covariances were slightly lower (.65 to .78; see Table 4.3), suggesting that the high correlations are partly due to participants showing consensus in rating domains for MIL, significance, purpose and coherence. The partial correlations are similar to previous findings which have shown that the constructs are not redundant despite their overlap (see Paper 3; George & Park, 2016b).

Table 4.3. Zero-order correlations below the diagonal; partial correlations, controlling for meaning framework domain, above the diagonal.

	Factor	1	2	3	4	5
1	MIL judgments	-	.69	.72	.65	.60
2	Significance	.77	-	.77	.70	.48
3	Purpose	.80	.83	-	.78	.53
4	Coherence	.74	.77	.83	-	.51
5	Importance	.68	.58	.62	.60	-

Note. All correlations were significant at p <.001.

A dimension and MIL judgments Level 1 model was run, with paths from feelings of significance, purpose, and coherence to MIL judgments. Furthermore, we modelled paths from the dimensions and MIL judgments to perceived importance. All variables were centred around individual mean scores so that: (a) the within-person effects would not be confounded with the between-person effects, and (b) cross-level interactions would not be confounded with between-person interactions (Hofmann & Gavin, 1998; Vignoles et al., 2006)[13]. This was a perfect-fitting

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[13] We also previously ran a model where significance, purpose, and coherence were modelled at both the within and between level. Constraining Level 1 and Level 2 paths to be equal yielded a worse fit than the unconstrained model, $\chi^2(6) = 69.11$, $p < .001$, suggesting that within-person relationships between variables were different than between-person relationships.

saturated model. We found that MIL judgments were significantly positively predicted by sense of significance ($\beta = .28$, $p < .001$, 95% CI [.24, .32]), sense of purpose ($\beta = .38$, $p < .001$, 95% CI [.33, .43]), and sense of coherence ($\beta = .16$, $p < .001$, 95% CI [.12, .20]). This model accounted for 68.9% of within-person variance in meaningfulness ratings. Moreover, perceived importance was positively predicted by MIL ratings ($\beta = .44$, $p < .001$, 95% CI [.39, .49]). Importance ratings were both directly and indirectly (via MIL judgments) predicted by purpose (indirect effect: $\beta = .17$, $p < .001$, 95% CI [.14, .20]; direct effect: $\beta = .09.$, $p = .004$, 95% CI [.03, .15]) and coherence (indirect effect: $\beta = .07$, $p < .001$, 95% CI [.05, .09]; direct effect: $\beta = .16$, $p < .001$, 95% CI [.11, .22]). In contrast, sense of significance predicted perceived importance only indirectly, through MIL judgments (indirect effect: $\beta = .12$, $p < .001$, 95% CI [.10, .15]; direct effect: $\beta = .00$, $p = .913$, 95% CI [-.05, .06]). The model accounted for 53.5% of within-person variance in importance ratings.

Next, we tested whether the three dimensions would continue to influence perceived importance while controlling for other important psychological needs (belonging, self-esteem, self-efficacy, distinctiveness, continuity and personal control). While MIL judgments were again predicted by significance ($\beta = .22$, $p < .001$, 95% CI [-.05, .06]), purpose ($\beta = .30$, $p < .001$, 95% CI [.25, .34]) and coherence ($\beta = .11$, $p < .001$, 95% CI [.07, .14]), they were also predicted by self-esteem ($\beta = .19$, $p < .001$, 95% CI [.15, .22]), and, more weakly, by continuity ($\beta = .04$, $p = .037$, 95% CI [.00, .06]). This model accounted for 71.1% of intrapersonal variance in MIL ratings. Perceived importance was both directly and indirectly predicted by coherence (indirect effect: $\beta = .04$, $p < .001$, 95% CI [.02, .04]; direct

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Nevertheless, between-person intercorrelations between significance, purpose and coherence were high (.86 to .95), suggesting multicollinearity. Consequently, the model was worse at capturing the individual-level relationships between constructs. This is unsurprising given that the study was designed to capture within-person variation.

effect: β = .13, *p* < .001, 95% CI [.08, .18]) and self-esteem (indirect effect: β = .07, *p* < .001, 95% CI [.05, .09]; direct effect: β = .14, *p* < .001, 95% CI [.09, .19]).

Importance ratings were indirectly predicted by significance (indirect effect: β = .09, *p* < .001, 95% CI [.07, .10]; direct effect: β = -.03, *p* = .289, 95% CI [-.08, .02]), purpose (indirect effect: β = .11, *p* < .001, 95% CI [.09, .14]; direct effect: β = .04, *p* = .213, 95% CI [-.02, .10]) and continuity (indirect effect: β = .01, *p* = .036, 95% CI [.00, .03]; direct effect: β = -.02, *p* = .344, 95% CI [-.06, .02]). The model accounted for 55.5% of the within-person variance in perceived importance.

Individual-Level Moderators

Cross-level moderation was tested by splitting the dimensions and MIL judgments Level 1 model sequentially, on each of the individual differences variables and performing multi-group comparisons. First, for each individual-level variable, we tested whether there was an overall moderating effect using nested-model comparisons between an unconstrained model and a model where paths from significance, purpose and coherence to MIL judgments were constrained to be the same across groups. If the constrained model showed a significantly worse fit, this was taken as evidence for moderation. We followed this up by constraining each path successively and comparing each of those models to the unconstrained model, in order to determine which paths were moderated.

Because this method involved running multiple significance tests, we controlled for the inflated Type I error, by applying Benjamini and Hochberg's (1995) false discovery rate (FDR) procedure, which has been recommended for use in SEM models as it provides more power than standard procedures that control for familywise error (Cribbie, 2007). Here we define a family as consisting of tests that are related in their intended use (Hochberg & Tamhane, 1987). As such, we apply

the FDR procedure for the model-level moderation tests and then, separately, within

the significant models, for testing differences in paths across groups.

Religious orientation. Religious orientation was a significant moderator,

$\chi^2(6) = 16.78$, $p = .010$. However, sense of significance had a similar positive

association with MIL judgments across all three groups, $\chi^2(2) = .70$, $p = .705$.

Similarly, after applying the FDR correction, religion did not significantly moderate

paths from purpose, $\chi^2(2) = 6.17$, $p = .046$, or coherence, $\chi^2(2) = 6.29$, $p = .043$.

Nevertheless, for agnostics, coherence was not a significant predictor of MIL

judgments, $\beta = .07$, $p = .106$, 95% CI [-.02, .16], whereas it was significantly

predictive for atheists, $\beta = .22$, $p < .001$, 95% CI [.14, .30], and religious participants,

$\beta = .14$, $p < .001$, 95% CI [.08, .21] (see Table 4.4).

Table 4.4. Comparing paths from meaning dimensions to MIL judgments for religious orientation

Dimensions	Agnostics			Atheists			Religious participants		
	β [95% CI]	SE	*p*	β [95% CI]	SE	*p*	β [95% CI]	SE	*p*
Significance	.28 [.18, .36]	.05	< .001	.28 [.20, .36]	.04	< .001	.27 [.20, .33]	.03	< .001
Purpose	.48 [.38, .58]	.05	< .001	.32 [.23, .41]	.05	< .001	.37 [.29, .44]	.04	< .001
Coherence	.07 [-.02, .16]	.04	.131	.22 [.14, .30]	.04	< .001	.14 [.08, .21]	.03	< .001

Moral foundation preference. Moral foundation preference significantly moderated paths to MIL judgments, $\chi^2(3) = 13.97$, $p = .003$. As such, we looked at the pattern of relationships for each group separately. The relationship between significance and MIL judgments did not differ by group, $\chi^2(1) = 2.66$, $p = .103$. Similarly, the relationship between purpose and MIL judgments was not significantly moderated by moral foundation preference, $\chi^2(1) = .03$, $p = .861$. However, moral foundation preference moderated the relationship between coherence and MIL judgments, $\chi^2(1) = 10.79$, $p = .001$, such that coherence was only predictive of MIL judgments for those who chose an individualizing foundation, but not for those who selected a binding foundation (see Table 4.5).

Table 4.5. Comparing paths from meaning dimensions to MIL judgments for moral foundation type

Dimensions	Individualizing foundations			Binding foundations		
	β [95% CI]	SE	p	β [95% CI]	SE	p
Significance	.26 [.23, .32]	.02	< .001	.37 [.27, .48]	.05	< .001
Purpose	.37 [.32, .42]	.03	< .001	.39 [.27, .49]	.06	< .001
Coherence	.19 [.14, .23]	.02	< .001	.00 [-.10, .10]	.05	.969

Social versus personal focus. Having a social versus personal focus emerged as a significant moderator, $\chi^2(3) = 11.76$, $p = .008$. Surprisingly, significance was more strongly associated with MIL ratings for those with a personal focus as opposed to a social focus, $\chi^2(1) = 11.29$, $p < .001$ (see Table 4.6). Social versus personal focus did not significantly moderate individual paths to MIL judgments from purpose, $\chi^2(1) = 1.84$, $p = .175$, or coherence, $\chi^2(1) = .58$, $p = .447$.

Other moderators. There was no evidence for moderation by free will beliefs, $\chi^2(3) = 1.60$, $p = .660$, by outlook on human nature, $\chi^2(3) = 2.75$, $p = .432$, or by growth versus self-protection focus, $\chi^2(3) = 3.82$, $p = .282$.

Table 4.6. Comparing paths from meaning dimensions to MIL judgments for social versus personal focus

Dimensions	Social focus			Personal focus		
	β [95% CI]	SE	p	β [95% CI]	SE	p
Significance	.10 [.04, .15]	.03	.001	.15 [.09, .20]	.03	< .001
Purpose	.56 [.51, .61]	.03	< .001	.61 [.57, .66]	.02	< .001
Coherence	.22 [.15, .29]	.03	< .001	.12 [.06, .18]	.03	< .001

Discussion

We aimed to test whether MIL judgments are informed by feelings of purpose, significance and coherence by focusing on within-person variation in ratings of meaning frameworks. This allowed us to measure MIL judgments indirectly and gain insight into how people rate meaning frameworks for meaningfulness. We found that a meaning framework that granted a sense of purpose, coherence and significance was also associated with higher sense of MIL. In turn, MIL judgments were associated with the importance of a meaning framework. These findings persisted even while controlling for how well a meaning framework satisfied identity and control needs.

Interestingly, significance (and purpose, after partialling out the effects of satisfying identity motives and need for control), only influenced ratings of importance through MIL judgments. In previous research, out of the three dimensions, significance most reliably informed MIL judgments prospectively and across contextual factors (see Paper 3). The current results support the idea that sense of significance is a specific MIL-related construct (Martela & Steger, 2016) that informs MIL judgments. In contrast, coherence predicted perceived importance both directly and through MIL judgments, which suggests that it might also fulfil

psychological functions that are independent of explicit MIL judgments (for a similar discussion, see Paper 3).

We also explored individual-level moderators derived from a participant's meaning framework content. Moral foundation preference was a significant moderator such that those who held binding moral foundations were less concerned with coherence in judging the meaningfulness of their frameworks. This is surprising given that these foundations rely on order-affirming entities such as laws, loyalty and authority. However, abstract thinking might elicit a preference for individualizing foundations, whereas concrete thinking might prompt a preference for binding foundations (Napier & Luguri, 2013). To the extent that a preference for abstract thinking makes it more likely to reflect on coherence when making MIL judgments, then this pattern of results could be explained by thinking style. Future research should examine this possibility.

Furthermore, there was evidence that those who prioritized values with a personal focus (e.g., self-direction, stimulation) judged the meaningfulness of their frameworks as more strongly positively associated with significance than those who preferred values with a social focus (e.g., benevolence, conformity; Schwartz et al., 2012). This seems surprising as, particularly in a secular context, people might derive a sense of significance from their close relationships to others (e.g., my life matters because it matters for other people). Nevertheless, this effect could be specific to our US sample as previous research has shown that Western nations tend to value self-expression and self-direction more than other cultures (e.g., Vignoles et al., 2016). In turn, sense of significance may be fulfilled through leaving a legacy for future generations, which involves creating a powerful extension of one's self (see research on generativity; McAdams, Hart & Maruna, 1998). Consequently, sense of

significance might be more important for MIL judgments for those who have a stronger personal focus within a cultural context that promotes self-expression.

There was also evidence that religious identity moderated the pattern of relationships from dimensions to MIL judgments, although none of the individual moderation effects underlying this omnibus finding reached statistical significance, when correcting for cumulative Type I error. Nevertheless, the pattern of relationships suggests that, at least in terms of the relationship between coherence and MIL judgments, agnostics and atheists might not be as similar to one another as previously assumed (e.g., Paper 3). This can be addressed in future studies by recruiting larger samples from more diverse populations. Alternatively, individual differences could be explored using continuous measures. Some meaning frameworks are not mutually exclusive within a domain. For instance, people can endorse several moral foundations or personal values concomitantly (Haidt & Graham, 2007; Schwartz, 1992). Comparing participants on their most important moral foundation or value endorsed reveals individual differences broadly, but using continuous measures might better capture complex moderating effects.

Limitations and Future Directions

If certain features of people's meaning frameworks fulfil a need for MIL, then people might be more motivated to hold beliefs, values, identities and attitudes that have those features. Previously, meaning frameworks have been thought to mainly fulfil a need for coherence in relation to meaningfulness (e.g., Heine et al., 2006). Our findings show that the other two dimensions of MIL also contribute to perceived meaningfulness, thus supporting tripartite accounts of MIL. Furthermore, these findings suggest extending the literature studying compensation in response to meaning threat to incorporate dimensions beyond coherence. If people experience a

deficit in one of the three dimensions of MIL, then they would perhaps show a preference for the meaning framework that most strongly affirms that dimension. For instance, information that undermines people's sense of purpose would orient them to purpose-affirming meaning frameworks to restore MIL. Discrete purpose, significance, or coherence threats would be difficult to induce experimentally because the three dimensions of MIL are highly related, but such studies would bring strong support for their conceptual utility as distinct factors.

Moreover, if sense of MIL predicts which meaning frameworks are more important, this could contribute to understanding how MIL impacts upon thought and behaviour. For instance, when people hold important attitudes on an issue, they will seek more related information and process it more deeply, they will be more resistant to persuasion against that issue, and they will anticipate distress in response to counter-attitudinal policies (Holbrook, Berent, Krosnick, Visser, & Boninger, 2005; Zuwerink & Devine, 1996; for a review see Eaton & Visser, 2008). To the extent that these findings can be extrapolated to meaning frameworks more widely, the role of perceived sense of MIL should also be explored in future studies. Would people more strongly defend and preferentially process information related to meaning frameworks that are meaningful, regardless of how important they are perceived to be?

The correlational nature of our study design prevents us from inferring directional relationships. Each of the dimensions of meaning could be predicted by, rather than predictive of, MIL judgments. However, MIL judgments are defined as broad, context-free life appraisals, whereas the dimensions are at a lower level of abstraction, describing more specific phenomena: sense of purpose is restricted to the domain of motivation, sense of significance to evaluation, and sense of coherence to

understanding (Martela & Steger, 2016). Furthermore, recent longitudinal evidence firmly suggests that significance is a precursor of sense of MIL, at least at the level of individual differences (see Paper 3). Nevertheless, future research could model within-person variation in MIL judgments across time to provide evidence of temporal ordering.

Finally, our list of meaning framework domains was not meant to be exhaustive; we simply aimed to elicit diverse frameworks in terms of content, which, in turn, would be associated with a wide range of MIL ratings. Regardless of framework content, we have found that framework type was differentially related to MIL ratings: values and identities were associated with higher sense of MIL than were attitudes, whereas beliefs and attitudes did not differ. Nevertheless, future studies should systematically explore how varying the level of specificity of a framework domain on the same topic may elicit different levels of MIL. For instance, the domain "socioeconomic beliefs" could have been construed more broadly as "political ideology" (liberalism versus conservatism), or more narrowly as "attitudes towards people on welfare".

Concluding Remarks

To summarise, our current results suggest that people's judgments about the meaningfulness of their meaning frameworks are related to their perceived significance, purpose and coherence). This study employed a novel design to provide empirical evidence for an account that aimed to integrate insights from the meaning-threat literature with recent definitions of MIL and previous operationalisations of the construct in terms of MIL judgments. We hope that this research may lead to better understanding of the role of meaning-related constructs in human functioning and their place within the wider personality and social psychology literature.

GENERAL DISCUSSION

Summary of Key Findings

The aim of this thesis was to find factors that are uniquely predictive of the subjective experience of MIL. This would help gain further definitional clarity for the construct of MIL and test more recent integrative accounts (e.g., George & Park, 2016a, Martela & Steger, 2016). Furthermore, these results could prescribe ways in which people can feel more meaningful either on a more momentary basis or across time.

First, I focused on short-term fluctuations in MIL judgments (Papers 1 and 2) and associated constructs (Paper 1) as a response to experimental manipulations. In Paper 1, we showed that there are differences in the effects of self-uncertainty and general uncertainty inductions on state measures of uncertainty. A self-uncertainty induction led to higher felt uncertainty about the self, but not to higher felt general uncertainty. Furthermore, this effect was moderated by relevant self-related processes such that those with defensive self-esteem (low implicit and high explicit self-esteem) showed a stronger effect of the self-related uncertainty manipulation. I interpret this as evidence that different types of coherence are associated with distinct psychological states. Nevertheless, this finding was qualified by the general uncertainty induction not predicting any measure of self-reported uncertainty. Moreover, neither manipulation predicted MIL judgments. Similarly, in Paper 2, MIL judgments were not influenced by manipulating factors that have previously been associated with MIL, belongingness and personal control.

In Paper 3, we focused on the three dimensions of MIL (coherence, purpose and significance) as predictors of subjective MIL judgments across time. In Study 1, we developed non-overlapping short measures of sense of MIL, coherence, purpose

and significance, which had a balanced set of negative and positively phrased items and were distinct from related constructs of belonging, control, self-efficacy and self-esteem. Furthermore, we showed that the effects of significance and purpose on MIL judgments were not reducible to affect. Studies 2 and 3 used these newly developed measures to show that sense of significance was a consistent prospective predictor of sense of MIL over a one-month period, across samples (students and online panel participants) and other contextual factors (e.g., religion, gender). Sense of purpose and coherence were more situationally predictive with their effects being moderated by religion: religious participants relied on coherence but not purpose to make MIL judgments, whereas non-religious participants relied on purpose but not coherence (Study 3).

Finally, Paper 4 showed that there is within-person variation in how meaningful people see their endorsed meaning frameworks (e.g., identities, beliefs, values and attitudes), and that this can be explained through sense of significance and purpose, and, to a lesser extent, coherence. Furthermore, we were able to show that these relationships are moderated by individual differences in moral foundation preference, and holding values that focus on growth as opposed to self-protection.

Implications for the Study of MIL

Throughout this thesis, I have looked at overt, explicit MIL judgments. In this sense, this work has been aligned with accounts that describe meaningfulness being attained through a process of active reflection: MIL is seen as "tied up with the unique capacity of human mind for reflective, linguistic thinking" (Martela & Steger, 2016, p. 7). Previous empirical work has also assumed that meaning is associated with thoughtfulness and deliberate scrutiny of one's life. For instance, some have attempted to measure MIL based on participants' ability to articulate why life is

meaningful in an essay (Lambert et al., 2013). Nevertheless, the measure of articulated meaning correlated modestly with self-reported MIL scales ($r = .28$).

Instead, others have assumed that MIL judgments are a result of effortless, automatic processing of stimuli in one's environment (e.g., King, 2012; Heintzelman & King, 2014a; Heintzelman & King, 2016). Meaningfulness does not seem to be a rare state that is only attained by the person who has undergone a long process of self-discovery and introspection. This is supported by people consistently reporting high sense of MIL across studies (Heintzelman & King, 2014b) which suggests that it is a common state. Furthermore, research shows that high sense of MIL is associated with high faith in intuition (Heintzelman & King, 2016), and having high positive affect (King et al., 2006; Hicks & King, 2009b; Hicks, Schlegel, & King, 2010). Moreover, as shown in Papers 1, 2, and 3 of this thesis project, sense of MIL is very resistant to change.

King (2012) suggests that reflective and intuitive accounts could be reconciled using a dual-process model of information processing (e.g., Bargh, 1989) where one system (System 1) is rapid and intuitive and the other system is slow and effortful (System 2). It is expected that System 1, being less resource-intensive, is used most of the time. This system generally signals to the individual that all is right (usually through positive affect) and that one can proceed as normal. Applying this model to MIL, it has been suggested that System 1 is about coherence: to what extent regularities and reliable patterns are perceived in one's surroundings (Heintzelman & King, 2014a; Heintzelman et al., 2013). In contrast, System 2 is used to construct meaning when a "problem" is detected, when something does not "*feel right*" (King, 2012, p. 14). Evidence for this system comes from the literature on meaning-making in response to stressors (see Park, 2010). Indeed, in feedback

received from participants in our research, people do not seem to spontaneously think about meaning in their day-to-day lives unless prompted to do so, usually by an event that challenges their assumption that life is meaningful. As such, there is an interplay between reflective and intuitive modes of processing with the latter accounting for most day-to-day feelings of MIL.

Applied to the current findings, the absence of significant relationships between coherence and sense of MIL (Paper 3) or links that were weaker than expected (Paper 4), could be explained through our mode of measurement. If "sense is not made, but indeed, sensed" (King, 2012, p. 129), then participants would struggle to consciously reflect on the coherence of their experiences and accurately estimate how coherent their lives feel. Nevertheless, self-related coherence might involve a more conscious act of self-reflection than feelings of coherence about the world (e.g., people seem to be able to estimate a sense that their identity stays the same over time; Sedikides, Wildschut, Routledge, & Arndt, 2015). This would explain why participants could explicitly report that they felt less certain about themselves after an overt self-related uncertainty manipulation, but no effects were found for general uncertainty (Paper 1). However, our findings suggest that people's MIL judgments are about significance (Papers 3 and 4). Critically, other researchers have argued that significance might be the dimension that most strongly relies on effortful deliberation (Heintzelman & King, 2016). This pattern of results supports the notion that MIL consists of intuitive and reflective processes, and that MIL judgments mainly capture the latter.

If MIL judgments are explicit measures of sense of MIL that capture effortful reflection on the topic, then complementary implicit measures of MIL should be developed. Similar examples exist in the literature. As described in Paper 1, people

have differentiated between implicit and explicit self-esteem, where the two have also been described in the context of dual-systems of information processing (Buhrmester, Blanton, & Swann, 2011). Implicit self-esteem has been measured using the Implicit Association Test (IAT; Farnham, Greenwald, & Banaji, 1999). In the latter task, participants are asked initially to categorise words on one dimension (e.g., pleasant versus unpleasant words, or self-related versus non-self-related words), and then they are asked to categorise words from both dimensions where the difference in reaction times where the categories of self-related and unpleasant are paired, as opposed to self-related and pleasant. If participants are faster at associating words with the self-related and pleasant pairing, they are said to have high self-esteem. A similar task could be adapted for meaningfulness, whereby people would see MIL-related words (e.g., purposeful) as opposed to meaningless words (e.g., pointless). As in the self-esteem literature, high implicit and high explicit sense of MIL would be most desirable (e.g., secure self-esteem; Jordan et al., 2003)

Limitations

Throughout this project, I have aimed to focus on subjective appraisals of meaningfulness as captured within MIL judgments. Nevertheless, some people might assume that life is objectively meaningful (e.g., through religious belief and having a "sacred purpose"; e.g., Pargament, Magyar-Russell, & Murray-Swank, 2005) whereas others might see the world as inherently meaningless. Consequently, some participants might use the sense of MIL items to record beliefs in an objectively meaningful world rather than their subjective states. No studies have directly compared perceptions that *the world* is meaningful (objective meaningfulness) with feelings that *one's own life* is meaningful (MIL judgments). In order to further refine MIL measurements, one would need to demonstrate that the sense of MIL scale

consistently records the same thing. Furthermore, in order to demonstrate the utility of the MIL construct, measures of MIL judgments should reflect people's ontological and epistemological assumptions about meaning, without being completely reduced to them.

It is also worth considering *who* is making these MIL judgments. Across papers, we have recruited either single-culture samples (UK, US), or mixed-culture samples, as well as student samples or mixed-occupation samples. When findings are consistent across studies, the use of diverse samples strengthens our claim that significance is a universal precursor of MIL judgments. However, when findings diverge, this poses unique interpretational challenges. For instance, in Paper 3, Study 3, using a culturally-diverse sample, we found a moderating effect of religious belief that we did not replicate in Paper 4, using US participants. Thus, it is unclear whether this failure to replicate was due to the study design (i.e., MIL judgments made at the level of meaning frameworks rather than at an individual-level) or other cultural differences between these two samples.

Future Directions

Across papers, the universality of sources of MIL judgments has been mostly assumed rather than directly measured. In Paper 3, we tested the moderation effects of not having English as a first language and found no significant effects. Nevertheless, this is no substitute for a systematic study of cross-cultural differences using translation and backtranslation procedures (Brislin, Lonner, & Thorndike, 1973; Sireci, Yang, Harter, & Ehrlich, 2006). Furthermore, relevant cross-cultural moderators should be considered (e.g., cultural contexts that either promote self-expression or harmony; Vignoles et al., 2016).

Translating the three dimensions of MIL into other languages might raise unique challenges as these fulfil overlapping MIL-related functions (e.g., Martela & Steger, 2016), and the terms used to describe them have often been conflated with one another. In a practical sense, the similarities in usage between the terms might not pose immediate translation problems because of the nature of the items that comprise each scale. For instance, the items capturing sense of significance scale developed in Paper 3 never use the term "significance". Instead, they directly get at thoughts that would be associated with someone having a sense of significance (e.g.," Even considering how big the universe is, I can say that my life matters"). However, if the terms for purpose, significance, coherence and meaning have different semantic similarities in other languages, then this would have consequences for how construct-relevant information is retrieved (e.g., Baddeley, 1966; Craik & Levy, 1970). For instance, the Romanian term for significance ("semnificaţie") would just as commonly (or more commonly) be used in relation to "understanding". The Romanian equivalent of phrases like "What's the significance of this text?" is more likely to be interpreted as "What's the meaning of this text?" rather than "What's the importance of this text?". Before use in a cross-cultural context, MIL measures that differentiate between the three dimensions of MIL should go through a rigorous process of validation, to avoid cross-cultural findings driven by linguistic artefacts.

Regardless of cultural context, the seemingly universal link between significance and MIL judgments may be qualified by moderating factors not considered in the current research project. For instance, narcissism is a positive self-view that involves seeing oneself as better than others, but, unlike self-esteem, it is not linked to communal traits (e.g., agreeableness, morality; W.K. Campbell,

Rudich, & Sedikides, 2002). In line with the Paper 4 finding that having a personal focus (as opposed to a social focus) is related to a stronger association between significance and MIL judgments, those who are more narcissistic, compared to those who hold other forms of positive self-regard, may derive more meaningfulness from the sense that their life matters on a global scale. While subclinical narcissism is associated with wellbeing factors (e.g., higher life satisfaction, lower anxiety; Sedikides, Rudich, Gregg, Kumashiro, & Rusbult, 2004), it is also associated with defensiveness and low implicit self-esteem (Jordan et al., 2003). As such, it is unclear whether potential interventions aimed at bolstering significance to increase meaningfulness would be adaptive for this population.

Potential Applications

Research on defining MIL has been considered an endeavour pursued for the sake of gaining knowledge but with unclear practical applications. For instance, conducting research in this area has been compared to declaring: "I am conducting research with no practical implications that I know of, and I am proud" (Arpaly, 2010, p. 85). This statement is misleading as most researchers studying MIL hope to attain insight into how people can lead the best possible lives, with eventual applications similar to those of other positive psychology constructs (see Seligman & Csikszentmihalyi, 2000). The reason that not many practical applications have stemmed out of this endeavour yet is perhaps more indicative of the ambitious scope of this project, rather than its uselessness.

Insights from this thesis could contribute to existing therapeutic interventions focused on increasing feelings of MIL (e.g., L. P. M. Thomas, Meier, & Irwin, 2014; Wong, 1997). These approaches are largely based on Frankl's (1956/2004) logotherapy. As these therapeutic interventions are based on reflection and

introspection, I consider that the current findings highlighting the role of significance in increasing explicit sense of MIL are relevant. Perhaps a heightened focus on making the person feel valued, or reflective practices on why individual lives are worthwhile could enhance existing therapeutic techniques.

Furthermore, understanding how some meaning frameworks are rated as more meaningful than others could facilitate transition to more secular systems of understanding. Religion has been shown to fulfil important protective roles in people's lives such as helping adjustment to negative life events (e.g., McIntosh, Silver & Wortman, 1993), buffering against reminders of one's mortality (e.g., Norenzayan & Hansen, 2006), and buffering against diminished personal control (Kay et al., 2008). Moreover, MIL judgments have been shown to mediate between 53.4% and 92.3% of the effect of religiosity on other well-being outcomes (Steger & Frazier, 2005). Nevertheless, attendance at religious services has been associated with heightened willingness to sacrifice for one's religious ingroup and increased hostility towards religious outgroups (e.g., Ginges, Hansen & Norenzayan, 2009). In addition, more extreme religious beliefs have been linked to prejudice against minority groups (e.g., Altemeyer & Hunsberger, 1992), as well as discriminatory views against gays (e.g., Laythe, Finkel, Bringle & Kirkpatrick, 2002). These findings suggest that other sources of existential security and meaningfulness should be sought. Findings from this thesis project show how alternative, non-religious meaning frameworks can provide a sense of MIL to the extent that they make one feel that one's life matters and provide a sense of directionality.

Final Remarks

This thesis project can be distilled into several key findings. Firstly, people's MIL judgments seem resistant to influence from brief experimental manipulations,

and this might explain why there have been more correlational studies looking at sense of MIL compared to experimental studies. Secondly, people seem to be better able to express disruptions in perceived self-related coherence, than they are able to express disruptions in sense of coherence more generally. Nevertheless, sense of coherence seems to be, at best, a weak, situationally-contingent predictor of MIL judgments. Instead, sense of significance consistently informs MIL judgments. This pattern of findings does not necessarily suggest that coherence is not an important facet of MIL, but, instead, it raises the possibility that it might be best captured using implicit measures. Overall, our findings support the idea that MIL is about significance and, possibly, about purpose and coherence. Furthermore, we show how people's webs of propositions about themselves and the world (i.e., meaning frameworks) serve a need for meaningfulness which in turn predict their importance.

The study of MIL within psychology has been questioned, despite people's fascination with the construct and its links to desirable outcomes. This area of research can seem inscrutable due to the inconsistent use of terminology and the highly abstract nature of the target construct. Furthermore, empirical work can be highly frustrating as key constructs are difficult to operationalise and measure cleanly. Finally, findings often raise more questions than they answer. However, researchers do not study certain topics because they are easy, but because they are interesting. In this sense, few other topics have sparked people's imaginations so consistently and for so many centuries as meaningfulness.

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APPENDIX 1

Paper 1 questionnaire

Introduction and consent

Welcome to our study on preferences, personality traits and feelings. The study is brief and would take around 15-20 minutes to complete. The first part of the questionnaire will ask about your preferences and assess your personality. Then, you will be asked to complete a short reflective task. Finally, you will get to select among a series of adjectives and characteristics which describe the way you might feel and complete a short cognitive task. **There are no right or wrong answers; we would simply like to know what you think. Also, don't spend to long on any one item; often, the first answer that comes to mind is the best. We only require that you complete the questionnaire in one sitting (no breaks).** This study has received ethics approval from the Science and Technology Cross-Schools Research Ethics Committee (C-REC) of the University of Sussex. Your participation is voluntary and you are free to withdraw from the study at any time without giving an explanation. All data we collect from you will be treated as confidential and will only be accessed by the research team. At the end of the study, you will be debriefed and the aims and purposes of the study will be fully explained. The results of the study will likely be written up for my PhD thesis and for academic papers that may be submitted for publication. No identifiable information will be used in the write-up. Please tick the box below to acknowledge that you have read the information above and that you agree to proceed to the study:

☐ I agree

Name-liking task (and filler items)

Below are a few questions assessing your preferences. Please use the scale below to

indicate how much you like the things described:

[Anchors: *Not at all (1) to Very much (5)*]

How much do you like your course, in total?

How much do you like your name, in total?

How much do you like the colour orange?

How much do you like autumn, on the whole?

How much do you like sports, in general?

How much do you like watching films?

Single item self-esteem scale (SISE; and filler items)

Below, there are a number of personality traits. Please use the scale next to each

statement to indicate the extent to which it does or does not apply to you. When the

statement includes a pair of traits, you should rate the extent to which the pair of

traits applies to you, even if one characteristic applies more strongly than the other.

[Anchors: *Does not apply at all (1) to Applies completely (5)*]

I am extraverted, enthusiastic.

I am critical.

I am extraverted, enthusiastic.

I have high self-esteem.

I am dependable, self-disciplined.

I am anxious, easily upset.

I am open to new experiences, complex.

I am reserved, quiet.

I am sympathetic, warm.

I am disorganized.

I am calm, emotionally stable.

I am conventional, uncreative.

Personal dilemma manipulation

Please try to think of an unresolved personal dilemma in your life. Such predicaments are characterized by the fact that you are not yet sure whether to take action in order to change things. You feel very uncertain and you ask yourself whether it might not be better to leave things as they are. In other words, you haven't decided to take action, but you haven't decided against it either. Please do not select a problem that is easy to solve, or that you have already made your mind up about. On the other hand, do not select one for which a solution will likely never be reached. The problem should be complex and should take the form of "Should I . . . or not?"

Please name the dilemma:

_____

In a word or two, please summarize your primary general value associated with changing the way things are:

_____

In a word or two, please summarize your primary general value associated with not changing, and leaving things the way they are:

_____

With regard to the above dilemma, please take a few minutes to list possible

IMMEDIATE consequences, positive and negative, of making a decision that

involves change.

    ◯ 1 _____

    ◯ 2 _____

    ◯ 3 _____

    ◯ 4 _____

    ◯ 5 _____

Now please try to think of and list any possible **LONG-TERM** consequences that

could result from the immediate consequences you listed above.
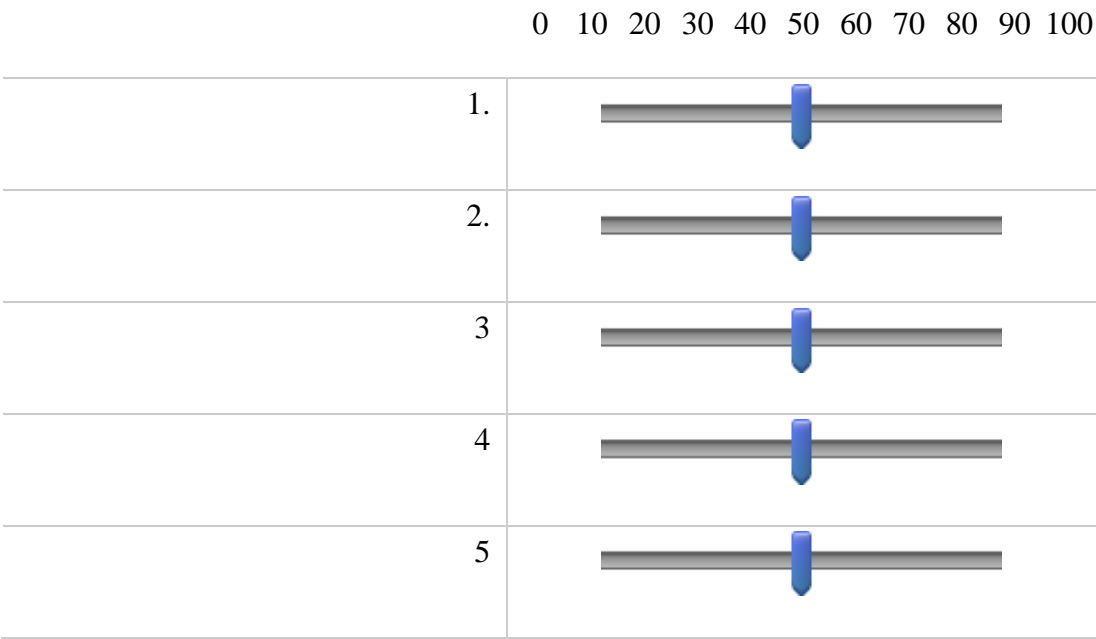
    ◯ 1. _____

    ◯ 2. _____

    ◯ 3 _____

    ◯ 4 _____

    ◯ 5 _____

Finally, beside each consequence listed above, please rate the certainty of occurrence in percentage. [piped text from earlier]

	0	10 20 30 40 50 60 70 80 90 100
1		
2		
3		
4		
5		

	0 10 20 30 40 50 60 70 80 90 100
1.	
2.	
3	
4	
5	

Please list the expected difficulties that might arise in trying to implement a decision involving change.

_____

_____

_____

_____

_____

Please take a few minutes to list possible **IMMEDIATE** consequences, positive and negative, of **leaving things the way they are and not making a change**.

○ 1. _____

○ 2. _____

○ 3 _____

○ 4 _____

○ 5 _____

Now please try to think of and list any possible **LONG-TERM** consequences that could ensue from the immediate consequences you listed above
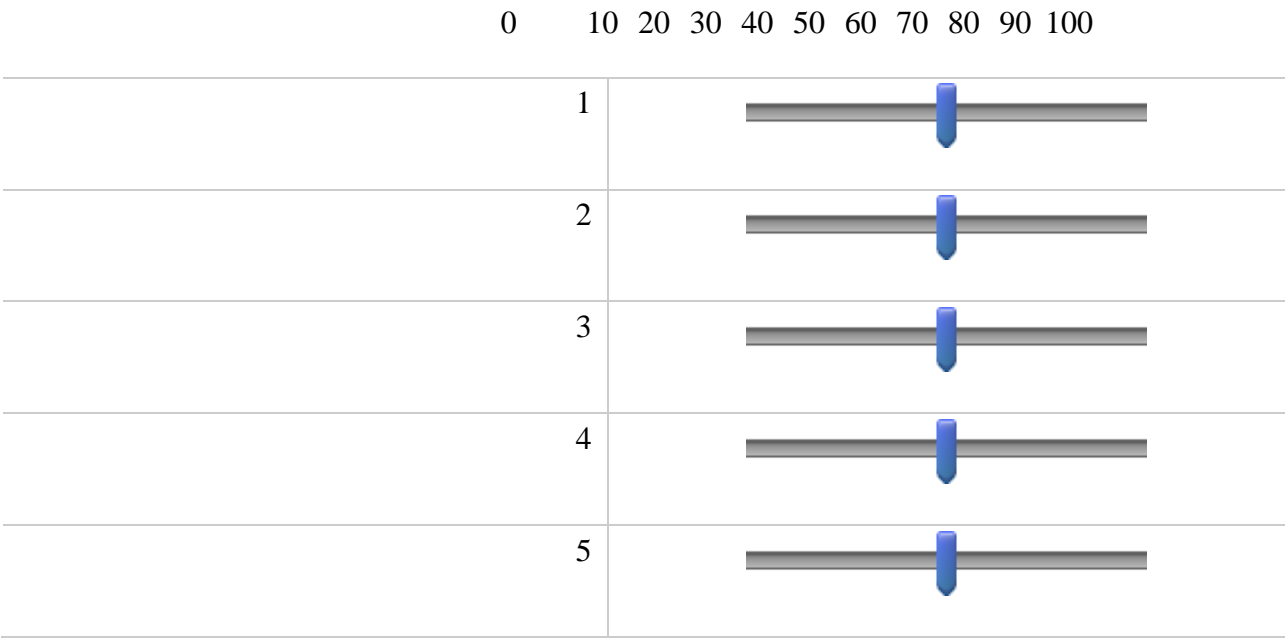
○ 1. _____

○ 2. _____

○ 3 _____

○ 4 _____

○ 5 _____

Finally, beside each consequence listed above, please rate the certainty of occurrence in percentage [piped text from earlier].

	0 10 20 30 40 50 60 70 80 90 100
1.	======================|=======================
2.	======================|=======================
3	======================|=======================
4	======================|=======================
5	======================|=======================

0 10 20 30 40 50 60 70 80 90 100

1.

2.

3.

4.

5.

Friend's dilemma manipulation

Please try to think of an unresolved personal dilemma in the life of a friend or

acquaintance of yours. Choose a predicament characterized by the fact that your

friend is not yet sure whether to take action in order to change things – but you feel

like you know what would best for your friend to do. Your friend feels very

uncertain and asks him or herself whether it might not be better to leave things as

they are. In other words, your friend hasn't decided to take action, but hasn't decided

against it either.   The friends' problem that you choose should be complex and

should take the form of "Should I . . . or not?"

Please name the dilemma that your friend faces:

_____

In a word or two, please summarize what your friend thinks is the primary general value associated with <u>changing</u> the way things are:

_____

In a word or two, please summarize what your friend thinks is the primary general value associated with <u>not changing</u>, and leaving things the way they are:

_____

With regard to the above dilemma of your friend, please take a few minutes to list possible immediate consequences, positive and negative, of his or her making a decision that <u>involves change</u>.

○ 1. _____

○ 2. _____

○ 3 _____

○ 4 _____

○ 5 _____

Now please try to think of and list any possible long-term consequences for your
friend that could result from the immediate consequences you listed above.

○ 1. _____

○ 2. _____

○ 3 _____

○ 4 _____

○ 5 _____

Finally, beside each consequence listed above, please rate the certainty of occurrence
in percentage.

0 10 20 30 40 50 60 70 80 90 100

1.

2.

3.

4.

5.

0 10 20 30 40 50 60 70 80 90 100

	1.	
	2.	
	3	
	4	
	5	

Please list the expected difficulties that your friend might face in trying to implement

a decision involving change.

_____

_____

_____

_____

_____

Please take a few minutes to list possible immediate consequences for your friend, positive and negative, of <u>leaving things the way they are</u> and <u>not</u> making a change.

        ○ 1. _____

        ○ 2. _____

        ○ 3 _____

        ○ 4 _____

        ○ 5 _____

Now please try to think of and list any possible long-term consequences for your friend that could ensue from the immediate consequences you listed above.

        ○ 1. _____

        ○ 2. _____

        ○ 3 _____

        ○ 4 _____

        ○ 5 _____

Finally, beside each consequence listed above, please rate the certainty of occurrence in percentage.

0 10 20 30 40 50 60 70 80 90 100

1.	
2.	
3	
4	
5	

0 10 20 30 40 50 60 70 80 90 100

1.	
2.	
3	
4	
5	
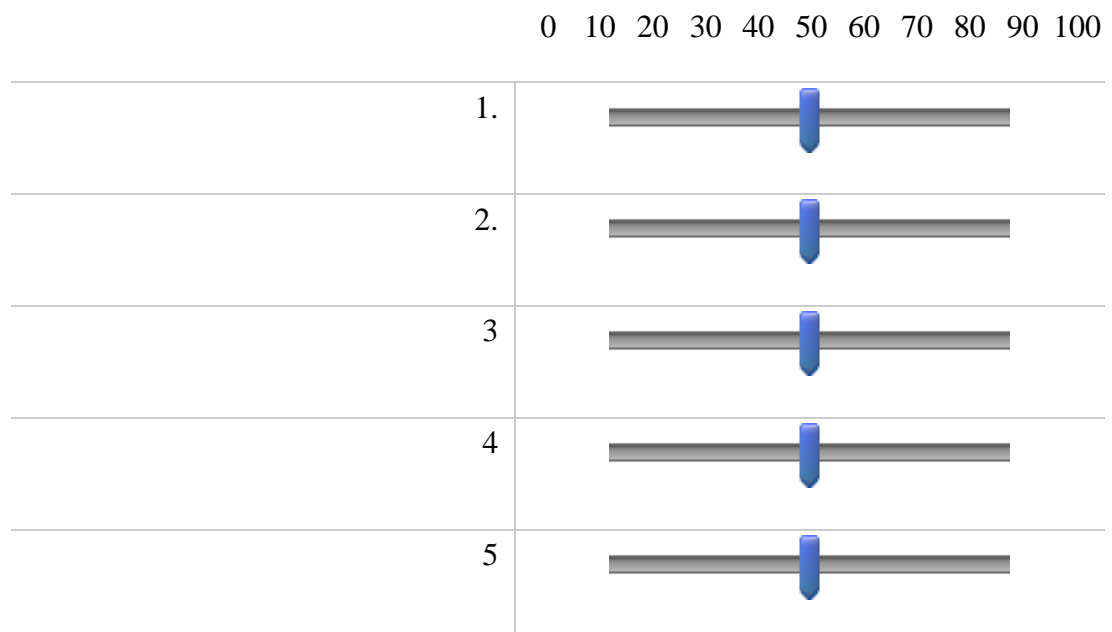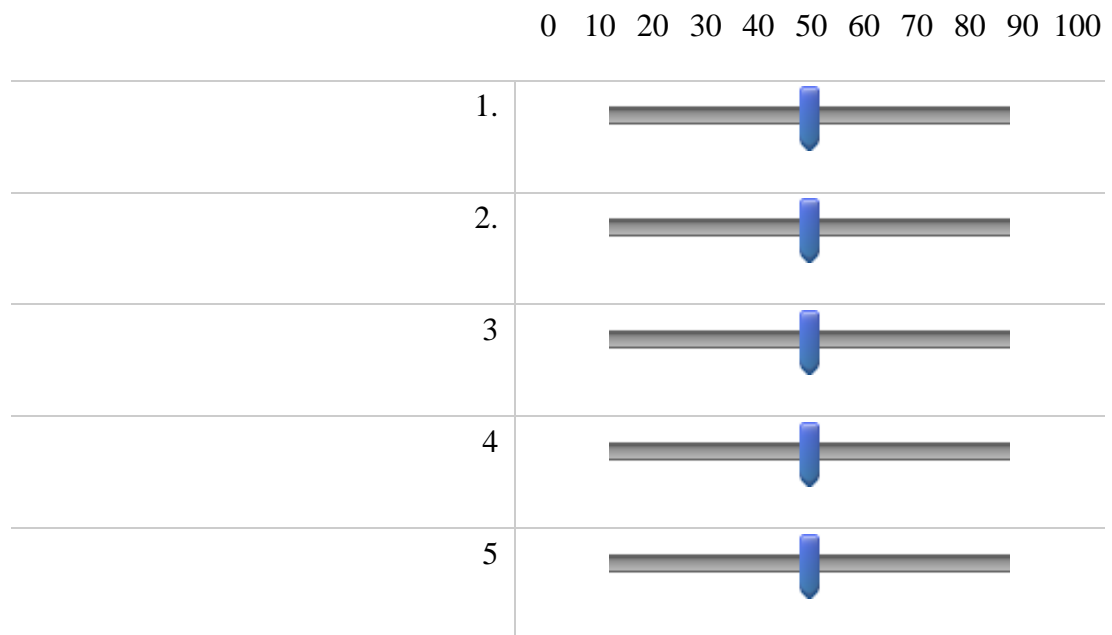
Self-uncertainty manipulation

Please answer the following questions as honestly as possible.

Think about significant aspects of your life that you feel **UNCERTAIN** about. List

the THREE (3) that you feel **MOST UNCERTAIN** about?

    ○ 1. _____

    ○ 2. _____

    ○ 3 _____

Self-certainty manipulation

Please answer the following questions as honestly as possible.

Think about significant aspects of your life that you feel **CERTAIN** about. List the

THREE (3) that you feel **MOST CERTAIN** about?

    ○ 1. _____

    ○ 2. _____

    ○ 3 _____

PANAS

[Anchors: *Very slightly or not at all (1),   A little (2), Moderately (3), Quite a bit (4), Very much (5)*]

Interested

Distressed

Excited

Upset

Strong

Guilty

Scared

Hostile

Enthusiastic

Proud

Irritable

Alert

Ashamed

Inspired

Nervous

Determined

Attentive

Jittery

Active

Afraid

Uncertainty accessibility

Below is a short cognitive task. Please complete the word by filling in the missing letters and write the word in the space next to the word. If there is more than one possible word, just fill in the first one that comes to mind. For instance, if you see ' _ e _ r a' You could write 'zebra' Please work quickly and do not spend too much time on any one stem. If you cannot think of a word, move on.

CHA _ _

DO _ _ _

C _ NTR _ L

PLA _ _

_ _ OK

CL _ _ K

WAT _ _

SH _ _ Y

TAB _ _

W _ _ DOW

MU _ _

_ _ NG

TR _ _

B _ T _ LE

T _ _ N

P _ P _ R

V _ _ UE

M_ J _ R

P _ _ TURE

_ O _ SE

FL _ W _ R

_ NS _ RE

R _ _ _ LESS

POST _ _

K _ _GS

Felt General Uncertainty

Indicate to what extent you feel in the ways described below right now, at the present moment. Use the following scale to record your answers:

	Very slightly or not at all	A little	Moderately	Quite a bit	Very much
	1	2	3	4	5
Mixed	1	2	3	4	5
Uneasy	1	2	3	4	5
Torn	1	2	3	4	5
Bothered	1	2	3	4	5
Preoccupied	1	2	3	4	5
Confused	1	2	3	4	5
Unsure of self or goals	1	2	3	4	5
Contradictory	1	2	3	4	5
Distractable	1	2	3	4	5
Unclear	1	2	3	4	5
Of two minds	1	2	3	4	5
Muddled	1	2	3	4	5
Restless	1	2	3	4	5
Confused about identity	1	2	3	4	5
Jumbled	1	2	3	4	5
Uncomfortable	1	2	3	4	5

Conflicted	1	2	3	4	5
Indecisive	1	2	3	4	5
Chaotic	1	2	3	4	5

Felt uncertainty about one's self

Anchors: *Very uncertain (1) to Very certain (9)*

Overall, how uncertain/certain do you feel about yourself?

Very uncertain   Very certain

1   2   3   4   5   6   7   8   9

Overall, how uncertain/certain do you feel about your future?

Very uncertain   Very certain

1   2   3   4   5   6   7   8   9

Identity motive satisfaction

Using the scale, please indicate the extent to which each statement describes your feelings at the present moment. Right now, how much do you feel...

Anchors: *Not at all (1) to Entirely (5)*

… your past, present and future are connected

… your life has no clear purpose

… satisfied with yourself

… included

... unique

… that your life has a 'story'

… unsure about the meaning of your life

… incompetent

… left out

… interchangeable with others

… a sense of belonging

… competent

… a sense of continuity between past, present and future in your life

… capable of coping with challenges

… your life has a clear sense of purpose

… excluded

… your life is meaningful

… anonymous

… you have high self-esteem

… comfortable with yourself

… confused about the real meaning of your life

… indistinguishable from others

… close to who you were in the past and who you will be in the future

… that you do not respect yourself

... a sense of discontinuity between your past, present and future

… you understand your life's meaning

… unable to deal with your challenges

… it is unpleasant to think about yourself

… you have a distinctive role in life

… unable to fulfil your goals

… dissatisfied with yourself

… that, in the course of your life, you have changed beyond recognition

… close to others

… confident to achieve your goals

… insecure about your self-worth

… that there is not much continuity in your life

… your life is meaningless

… incapable

… accepted

… too similar to others

… you have the knowledge and skill you need

… that your past, present and future are disconnected

… rejected by others

… you stand out from others

… your role in life is meaningful

… that you don't fit in

… distinctive

Demographics

Your age:

_____

Your gender:

Male

Female

Other (please specify) _____

Country of birth:

_____

For how many years have you lived in the UK?

I have always lived in the UK.

If you have not always lived in the UK, for how many years have you lived in the

UK? (Please only report full years and write this in digits e.g. "7" rather than "seven

years".) _____

What is your nationality? (if dual or mixed, please describe as accurately as possible)

_____

What is your ethnic group?

○ White

○ Black-African

○ Black-Caribbean

○ Asian-Chinese

○ Asian-Indian/Pakistani/Bangladeshi

○ Other (please specify)

_____

Are you currently pursuing a University degree (Undergraduate, Masters, PhD etc.)?

○ Yes

○ No

If you have answered 'Yes' to the previous question, please specify your course:

_____

Do you belong to a religion?

○ No, I do not belong to any religion

○ Yes, Christian (Please specify the denomination in the box below)

_____

○ Yes, Jewish (Please specify the denomination in the box below)

_____

○ Yes, Muslim (Please specify the denomination in the box below)

_____

○ Yes, Hindu (Please specify the denomination in the box below)

_____

○ Yes, Buddhist (Please specify the denomination in the box below)

_____

○ Yes, other (please specify)

_____

Probing questions

Finally, we would just like you to answer a set of questions about the tasks you have just completed for us.

What did you think the purpose of the experiment was?

_____

_____

_____

_____

_____

Have you completed any of these tasks before today?

○ Yes

○ No

If yes, can you briefly describe which one and when?

_____

_____

_____

_____

_____

Debrief

Thank you for your time.

The main aim of the study was to compare the effectiveness of two different types of self-uncertainty manipulation (i.e. tasks that are meant to engender some form of doubt with regards to the self and/or one's worldviews). Firstly, hidden among a series of filler items regarding preferences and personality traits, we measured explicit self-esteem ("I have high self-esteem") and implicit self-esteem ("How much do you like your name, in total?"). Then, in the direct uncertainty manipulation condition participants were asked to either list three important aspects of their life that make them feel uncertain (or certain, in the control condition). In the indirect uncertainty manipulation condition they were asked to think and write about an unresolved personal dilemma (or a friend's unresolved personal dilemma, in the control condition). A fifth condition was added (called the 'baseline condition') where participants were not given any of the above mentioned tasks. Afterwards, half of the participants across all conditions were asked to fill in a measure of affect ("Please rate to what extent you feel in each of the following ways at the present moment" - Interested, Distressed, Excited etc.). This was included as a delay after the manipulation and before the outcome variables. Evidence in the literature is mixed about whether people inhibit feelings of uncertainty in the first moments after encountering the uncertainty-inducing stimulus.   Outcome variables were meant to measure the effects of the self-uncertainty manipulations. They included a word completion task that measured how often the word stems would be completed with uncertainty-related words (e.g. "do _ _ _" can be completed using either "doubt" or "doors"). This indicated how accessible uncertainty-related words were to participants. Next, participants were asked to rate how much they felt that a series of

uncertainty-related words described them (e.g. mixed, uneasy, torn). Finally,

participants expressed agreement or disagreement with a number of statements

which helped identify the exact nature of the threat experienced (e.g. self-esteem

threat: "…dissatisfied with yourself", meaning threat: "… your life has no clear

sense of purpose").   Demographic data was also collected and participants were

asked to speculate on the purpose of the study to see to what extent they were aware

of the concepts measured.   **PLEASE REFRAIN FROM DISCUSSING THESE**

DETAILS WITH FELLOW STUDENTS WHILE DATA COLLECTION IS

STILL TAKING PLACE. If you have any concerns or questions related to this

study, please contact Vlad Costin via email at V.Costin@sussex.ac.uk

APPENDIX 2

Paper 2 (preliminary questionnaire materials)

Introduction and consent

Welcome to the preliminary part of our study on personal experience. This is a very short questionnaire (less than 5 minutes) that will ask you to reflect on your life as a whole and express agreement or disagreement on a number of statements about how you see your life. **There are no right or wrong answers; we would simply like to know what you think. Also, don't spend too long on any one item; usually, the first answer that comes to mind is the best.**　Your participation is voluntary and you are free to withdraw from the study at any time without giving an explanation. All data we collect from you will be treated as confidential and will only be accessed by the research team. You can withdraw your data from the study at any point before data analysis has commenced (to do so, you will need to quote your Unique ID, generated on the next page).　At the end of the study, you will be debriefed and the aims and purposes of our research will be fully explained.　The results of the study will be written up for my PhD thesis and for academic papers that may be submitted for publication. No identifiable information will be used in the write-up.　This study has been approved by the Sciences & Technology Cross-Schools Research Ethics Committee (crecscitec@sussex.ac.uk). The project reference number is ER/VC69/5. The University of Sussex has insurance in place to cover its legal liabilities in respect of this study.　By ticking the box below and clicking next, you acknowledge that you are over 16, have read and understood the information above, and consent to take part.

☐　I agree

Book a time for main study

Please book a time when you can come to the Pevensey 1 experimental cubicles (map included in the link below) for the main part of our study. **This must be scheduled at least 7 days from now.**

Book using the link below. This will open in a new page. **After booking a time, please return to this page to continue filling in this questionnaire.**

vladcostin-study.youcanbook.me

Unique ID

Please complete the information below which we need to be able to match your responses to the first and the second part of the study while protecting your

anonymity (in case you do not know one of those information, please put ZERO). Please enter all the letters in CAPITALS.

The third letter of your first name

_____

The day in the month which you were born (e.g. 21)

_____

The first letter of your mother's first name

_____

The day in the month which your mother was born (e.g. 15)

_____

The first letter of your father's first name

_____

Meaning in life

Using the scale, please indicate your feelings **at the present moment** by selecting how much you agree with the following statements:

[Anchors: *Fully disagree (1) to Fully agree (5)*]

My life is meaningful.

My life as a whole has meaning.

My entire existence is full of meaning.

My life is meaningless.

My existence is empty of meaning.

I feel that there is no meaning in my life.

Purpose in life

Using the scale, please indicate your feelings **at the present moment** by selecting

how much you agree with the following statements:

[Anchors: *Fully disagree (1) to Fully agree (5)*]

I have a good sense of what I am trying to accomplish in life.

I have a sense of direction and purpose in life.

I always have a series of goals to pursue.

I often feel like I am following a path in life.

Setting goals seems like a waste of time.

I often feel like I am wandering aimlessly through life.

My life has no purpose.

I don't know what I am trying to accomplish in life.

Demographics

Your gender:

○   Male

○   Female

○   Other (please specify)

_____

Your relationship status:

○   not in a relationship

○   married

○   separated

○   in a committed relationship

○   divorced

○   widowed

○   other (please specify)

_____

Country of birth

▼ Afghanistan ... Zimbabwe

Country of residence

▼ Afghanistan ... Zimbabwe

What is your ethnic group?

_____

What is your highest educational qualification?

_____

Are you currently pursuing a University degree (Undergraduate, Masters, PhD etc.)?

○   Yes

○   No

If you have answered 'Yes' to the previous question, please specify your course:

_____

Your employment status:

▼ Full-time employee ... Not applicable

Your current or former occupation:

▼ Professional or managerial (e.g., lawyer, university teacher, company manager) ...

Student

Think of this ladder as representing where people stand in Britain. At the top of the

ladder are people who are the best off, those who have the most money, most

education, and best jobs. At the bottom are those who have the least money, least

education, and worst jobs or no job.

Please select the number of the rung that best represents where you think you stand on the ladder.

▼ 10 ... 1

Compared to other people in this country, how would you describe your (or your family's) level of financial wealth? If you are in full-time education, please indicate your parent's or legal guardian's level of financial wealth.

○ Very poor

○ Moderately poor

○ Below average wealth

○ Average wealth

○ Above average wealth

○ Moderately rich

○ Very rich

Which one of the following best describes the place where you are currently living?

○ City/large town

○ Smaller/average town

○ Village/rural

Which one of the following best describes the place where you grew up?

○ City/large town

○ Smaller/average town

○ Village/rural

Do you belong to a religion?

○   No, I do not belong to any religion

○   Yes, Christian (Please specify the denomination in the box below)

_____

○   Yes, Jewish (Please specify the denomination in the box below)

_____

○   Yes, Muslim (Please specify the denomination in the box below)

_____

○   Yes, Hindu (Please specify the denomination in the box below)

_____

○   Yes, Buddhist (Please specify the denomination in the box below)

_____

○   Yes, other (please specify)

_____

End of preliminary study

Thank you very much for responding to our initial measures. Please turn up to your chosen time to the Pevensey 1 experimental cubicles.

For any questions regarding this study, contact me at v.costin@sussex.ac.uk

Study 2 (main questionnaire materials)

Introduction and consent

Welcome to our main study on personal experiences. The first part of the study is

qualitative (involves collecting rich textual data) and is looking at how people think

about specific past events in their lives. It will consist of two brief reflection tasks

that will take around 12-15 minutes. The second part of the study will ask you to

reflect on your life as a whole and express agreement or disagreement on a number

of statements about how you see your life. This part will take around 5 minutes. The

whole questionnaire should last about 20 minutes. **There are no right or wrong**

answers; we would simply like to know what you think.

  Your participation is voluntary and you are free to withdraw from the study at any

time without giving an explanation. All data we collect from you will be treated as

confidential and will only be accessed by the research team. You can withdraw your

data from the study at any point before data analysis has commenced (to do so, you

will need to quote your Unique ID, generated on the next page). At the end of the

study, you will be debriefed and the aims and purposes of our research will be fully

explained. The results of the study will be written up for my PhD thesis and for

academic papers that may be submitted for publication. No identifiable information

will be used in the write-up. This study has been approved by the Sciences &

Technology Cross-Schools Research Ethics Committee (crecscitec@sussex.ac.uk).

The project reference number is ER/VC69/5. The University of Sussex has insurance

in place to cover its legal liabilities in respect of this study. By ticking the box below

and clicking next, you acknowledge that you are over 16, have read and understood
the information above, and consent to take part.

☐ I agree

Unique ID

Please complete the information below which we need to be able to match your
responses to the first and the second part of the study while protecting your
anonymity (in case you do not know one of those information, please put
ZERO). Please enter all the letters in CAPITALS.

The third letter of your first name

_____

The day in the month which you were born (e.g. 21)

_____

The first letter of your mother's first name

_____

The day in the month which your mother was born (e.g. 15)

_____

The first letter of your father's first name

_____

Low belongingness induction

Please recall a particular incident in which you have felt intensely rejected in some
way, times that you felt as if you did not belong. These can be experiences of
rejection from another person (e.g. a time when someone no longer wanted to be
your friend) or they can be experiences of rejection from a group (e.g., a time when

you were excluded from a group of people). Please describe the situation in which you felt you did not belong– what happened, how you felt, etc.

_____

_____

_____

_____

_____

High belongingness induction

Please recall a particular incident in which you have felt accepted in some way, times that you felt as if you belonged. These can be experiences of acceptance from another person (e.g. a time when someone wanted to be your friend) or they can be experiences of acceptance from a group (e.g., a time when you were included in a group of people). Please describe the situation in which you felt you belonged– what happened, how you felt, etc.

_____

_____

_____

_____

_____

Low control induction

Please recall a particular incident in which you did not have any control over the situation. Please describe the situation in which you felt a complete lack of control – what happened, how you felt, etc.

_____

_____

_____

_____

_____

High control induction

Please recall a particular incident in which you were in complete control of the situation. Please describe the situation in which you felt in complete control– what happened, how you felt, etc.

_____

_____

_____

_____

_____

PANAS

Please rate to what extent you feel in each of the following ways at the present moment:

[Anchors: Not at all (1) to Entirely (5)]

Interested

Distressed

Excited

Upset

Strong

Guilty

Scared

Hostile

Enthusiastic

Proud

Irritable

Alert

Ashamed

Inspired

Nervous

Determined

Attentive

Jittery

Active

Afraid

Meaning in life (same as in the preliminary study)

Purpose in life (same as in the preliminary study)

Thanks!

Thank you very much for your valuable responses!

Please notify the experimenter that you have completed the questionnaire.

APPENDIX 3

Paper 3, Study 1 questionnaire

Introduction and consent

Welcome to our study on the experience of meaning in life. We want to see how people experience their lives as having or not having meaning. You will be shown several sets of statements about how you feel at the present moment. You will have to specify to what extent you agree or disagree with them. **There are no right or wrong answers; we would simply like to know what you think. Also, don't spend too long on any one item; often, the first answer that comes to mind is the best.** Your participation is voluntary and you are free to withdraw from the study at any time without giving an explanation. All data we collect from you will be treated as confidential and will only be accessed by the research team. You can withdraw your data from the study at any point before data analysis has commenced. At the end of the study, you will be debriefed and the aims and purposes of our research will be fully explained. The results of the study will be written up for my PhD thesis and for academic papers that may be submitted for publication. No identifiable information will be used in the write-up. This study has been approved by the Sciences & Technology Cross-Schools Research Ethics Committee (crecscitec@sussex.ac.uk). The project reference number is ER/VC69/5. The University of Sussex has insurance in place to cover its legal liabilities in respect of this study. By ticking the box below and clicking next, you acknowledge that you are over 16, have read and understood the information above, and consent to take part.

☐   I agree

Screening questions

Your age:

▼ Under 18 ... 99

How would you describe your level of English?

○　Native

○　Fluent

○　Working proficiency

○　Basic proficiency

Exclusion

Unfortunately, you are not eligible to take part in this study. Thank you for your

time!

If you have any further questions or concerns about the study, please contact Vlad

Costin at v.costin@sussex.ac.uk

PANAS

Please rate to what extent you feel in each of the following ways **at the present moment**:

[Anchors: *Very slightly or not at all (1), A little (2), Moderately (3), Quite a bit (4), Very much (5)*]

Interested

Distressed

Excited

Upset

Strong

Guilty

Scared

Hostile

Enthusiastic

Proud

Irritable

Alert

Ashamed

Inspired

Nervous

Determined

Attentive

Jittery

Active

Afraid

Meaning in life

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

My life is meaningful.

My life as a whole has meaning.

My entire existence is full of meaning.

My life is meaningless.

My existence is empty of meaning.

I feel that there is no meaning in my life.

Purpose in life

Using the scale, please indicate your feelings **at the present moment** by selecting

how much you agree with the following statements:

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

I have a good sense of what I am trying to accomplish in life.

I have a sense of direction and purpose in life.

I always have a series of goals to pursue.

I often feel like I am following a path in life.

I have overarching goals that guide me in my life.

I have aims in my life that are worth striving for.

I have certain life goals that compel me to keep going.

I have goals in life that are very important to me.

My direction in life is motivating to me.

I often feel like I am wandering aimlessly through life.

My life has no purpose.

I don't know what I am trying to accomplish in life.

My goals don't seem connected to one another

My current life course is not motivating

I don't have compelling life goals that keep me going.

Sense of coherence

Using the scale, please indicate your feelings **at the present moment** by selecting

how much you agree with the following statements:

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

I feel that events in my life follow a certain order.

I often feel that I can predict what is going to happen next.

I can see a connection between past, present and future events in my life.

My experiences tend to have common themes.

I can see how my decisions are influenced by my previous experiences.

My life makes sense.

I know what my life is about.

I can make sense of the things that happen in my life.

I understand my life

Looking at my life as a whole, things seem clear to me.

I don't understand what my life is about.

I can't make sense of events in my life.

I often feel that my life is chaotic.

My life feels like a sequence of unconnected events.

I see past, present and future events in my life as disconnected.

I struggle to find common themes that tie my experiences together.

I don't understand how my past decisions have led to where I am now.

Sense of significance

Using the scale, please indicate your feelings **at the present moment** by selecting

how much you agree with the following statements:

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

My life is inherently valuable.

Even a thousand years from now, it would still matter whether I existed or not.

Whether my life ever existed matters even in the grand scheme of the universe.

I am certain that my life is of importance.

Even considering how big the universe is, I can say that my life matters.

There is nothing special about my existence.

My existence is not significant in the grand scheme of things.

Given the vastness of the universe, my life does not matter.

My life has no objective value.

Sense of control

Using the scale, please indicate your feelings **at the present moment** by selecting

how much you agree with the following statements:

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

The events in my life are mainly determined by my own actions.

I feel like I am free to make my choices.

I feel that I have complete control over my life.

I am not in control of most things that occur in my life

What I do has very little effect on what happens to me.

I feel constrained by things outside of my control.

Self-liking

The statements below describe ways in which you might feel about yourself. Please indicate how you see yourself **at the present moment** by selecting how much you agree with the following statements:

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

I tend to devalue myself.

I am very comfortable with myself.

I am secure in my sense of self-worth.

It is sometimes unpleasant for me to think about myself.

I have a negative attitude towards myself.

I feel great about who I am.

I never doubt my personal self-worth.

I do not have enough respect for myself.

Sense of belongingness

The statements below describe ways in which you might feel about yourself. Please indicate how you see yourself **at the present moment** by selecting how much you agree with the following statements:

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

I feel included.

I feel that I fit in.

I feel accepted.

I have many experiences in common with those around me.

I feel a sense of togetherness with my peers.

I feel rejected by others.

I don't feel that I participate with anyone or any group.

I feel excluded.

My experiences are very different from those who are usually around me.

I feel like an outsider.

Connectedness with others

Below are seven diagrams that express varying degrees of relatedness or

connectedness with some other people. For each of the people listed below, indicate

which diagram best expresses your relationship with that person.

The relationship between you and your family members.

Self Other   Self Other   Self Other   Self Other

Self Other   Self Other   Self Other
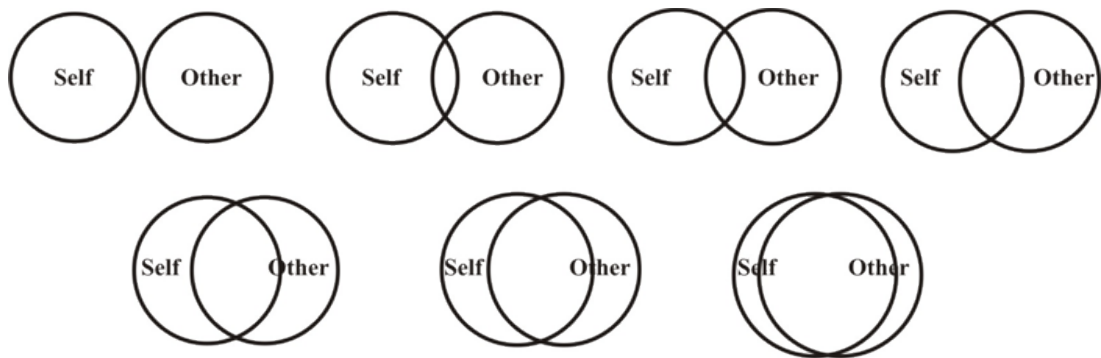
The relationship between you and your close friends.
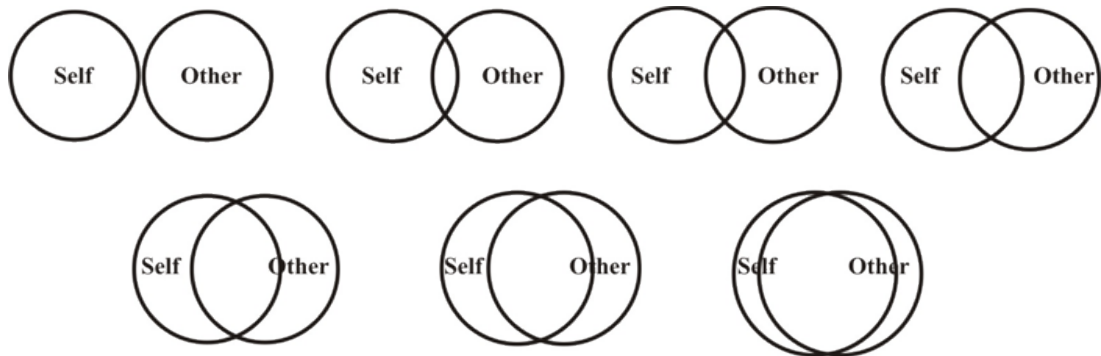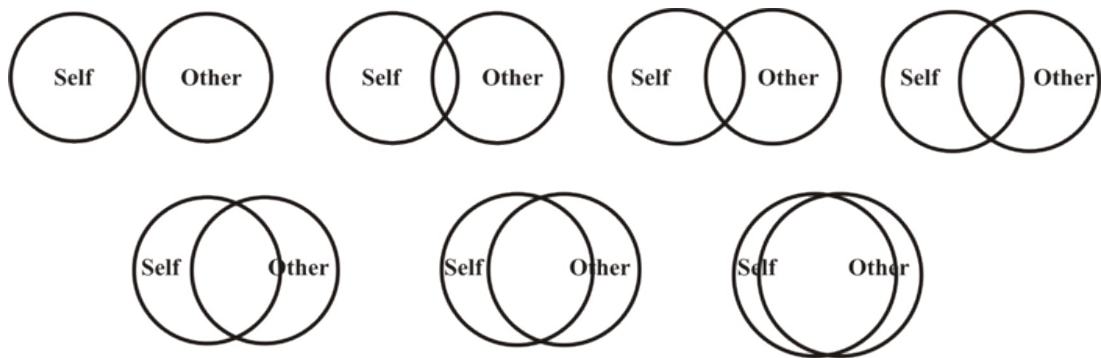
The relationship between you and the person with whom you feel closest.

Self-competence

The statements below describe ways in which you might feel about yourself. Please indicate how you see yourself **at the present moment** by selecting how much you agree with the following statements:

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

I am highly effective at the things I do.

I am almost always able to accomplish what I try for.

I perform very well at many things.

I am very talented.

At times, I find it difficult to achieve the things that are important to me.

I sometimes deal poorly with challenges.

I sometimes fail to fulfil my goals.

I wish I were more skillful in my activities.

FAD-Plus

For each statement below, indicate how much you agree or disagree.

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

People have complete control over the decisions they make.

People must take full responsibility for any bad choices they make.

People can overcome any obstacles if they truly want to.

Criminals are totally responsible for the bad things they do.

People have complete free will.

People are always at fault for their bad behavior.

Strength of mind can always overcome the body's desires.

People's biological makeup determines their talents and personality.

Psychologists and psychiatrists will eventually figure out all human behavior.

Your genes determine your future.

Science has shown how your past environment created your current intelligence and personality.

As with other animals, human behavior always follows the laws of nature.

Parents' character will determine the character of their children.

Childhood environment will determine your success as an adult.

I believe that the future has already been determined by fate.

No matter how hard you try, you can't change your destiny.

Fate already has a plan for everyone.

Whether people like it or not, mysterious forces seem to move their lives.

Whatever will be, will be – there's not much you can do about it

Chance events seem to be the major cause of human history.

No one can predict what will happen in this world.

Life seems unpredictable - just like throwing dice or flipping a coin.

People are unpredictable.

Luck plays a big role in people's lives.

What happens to people is a matter of chance.

Life is hard to predict because it is almost totally random.

People's futures cannot be predicted.

Government and control

For each statement below, indicate how much   you agree or disagree.

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

In general, my country's political system operates as it should

Most policies serve the greater good

In general, I'm satisfied with the way things are in my country.

Religion and control; religious orientation

Thinking about your religious and spiritual beliefs, as well as your conception of

God, please use the following response scales to answer the questions below.

[Anchors: *Very doubtful (1) to Strongly likely (7))*]

To what extent do you think it is feasible   that God, or some type of nonhuman

entity, is in control, at least in part, of the events within our universe?

To what extent do you think that the events   that occur in this world unfold

according to God's, or some type of nonhuman   entity's, plan?

How often do you attend religious services and activities?

○　　never

○　　1-2 times a year

○　　2-6 times a year

○　　7-11 times a year

○　　1-3 times a month

○　　at least once a month

How often do you pray or meditate outside of religious   services?

○   never

○   1-11 times a year

○   about once a month

○   about once a week

○   about once a day

○   several times daily

In general, how religious do you consider   yourself?

○   not at all religious

○   slightly religious

○   moderately religious

○   very religious

○   extremely religious

In general, how spiritual do you consider   yourself?

○   not at all spiritual

○   slightly spiritual

○   moderately spiritual

○   very spiritual

○   extremely spiritual

How much does religion influence the way you act in everyday life?

○   Not at all

○   Slightly

○   Moderately

○   Very

○   Extremely

Demographics

Your gender:

○ Male

○ Female

○ Other (please specify)

_____

Your relationship status:

○ not in a relationship

○ married

○ separated

○ in a committed relationship

○ divorced

○ widowed

○ other (please specify)

_____

Country of birth

▼ Afghanistan ... Zimbabwe

Country of residence

▼ Afghanistan ... Zimbabwe

What is your ethnic group?

_____

What is your highest educational qualification?

_____

Are you currently pursuing a University degree (Undergraduate, Masters, PhD etc.)?

○   Yes

○   No

If you have answered 'Yes' to the previous question, please specify your course:

_____

Your employment status:

▼ Full-time employee ... Retired

Your current or former occupation:

▼ Professional or managerial (e.g., lawyer, university teacher, company manager) ...

Student

X→

Think of this ladder as representing where people stand in your country. At the top of

the ladder are people who are the best off, those who have the most money, most

education, and best jobs. At the bottom are those who have the least money, least

education, and worst jobs or no job.

Please select the number of the rung that best represents where you think you

stand on the ladder.

▼ 10 ... 1

Compared to other people in your country, how would you describe your (or your family's) level of financial wealth? If you are in full-time education, please indicate your parent's or legal guardian's level of financial wealth.

○ Very poor

○ Moderately poor

○ Below average wealth

○ Average wealth

○ Above average wealth

○ Moderately rich

○ Very rich

Which one of the following best describes the place where you are currently living?

○ City/large town

○ Smaller/average town

○ Village/rural

Which one of the following best describes the place where you grew up?

○   City/large town

○   Smaller/average town

○   Village/rural

Do you belong to a religion?

○   No, I do not belong to any religion

○   Yes, Christian (Please specify the denomination in the box below)

_____

○   Yes, Jewish (Please specify the denomination in the box below)

_____

○   Yes, Muslim (Please specify the denomination in the box below)

_____

○   Yes, Hindu (Please specify the denomination in the box below)

_____

○   Yes, Buddhist (Please specify the denomination in the box below)

_____

○   Yes, other (please specify)

_____

Thanks

Thank you for your valuable participation! We would like to collect some more data at three future time points: one month from now, two months from now and three months from now. These questionnaires will be significantly shorter than this one. It would be very useful for our research if we can collect these measures from you at these future time points.

Please indicate whether we can contact you for future studies.

○　　Yes, I am happy to be contacted

○　　No

Unique ID

Please complete the information below. We need to be able to match your responses on the different parts of the study while protecting your anonymity.

In case you do not know one of those information, please put ZERO. Please enter all the letters in CAPITALS.

○   The third letter of your first name

_____

○   The day in the month which you were born (e.g. 21)

_____

○   The first letter of your mother's first name

_____

○   The day in the month which your mother was born (e.g. 15)

_____

○   The first letter of your father's first name

_____

Email

Please click here to provide your e-mail address in a separate survey. This will ensure that the data you just submitted cannot be linked to your personal email address, thus ensuring your anonymity.

https://universityofsussex.eu.qualtrics.com/SE/?SID=SV_5nJT8YgYOZnLzVP

Debrief

Thank you for your time! This study had several aims:

a) To develop a measure of significance (i.e. the sense that one's life has value), coherence (i.e. sense that one's life is orderly and predictable) and purpose (i.e. a central life aim), and see whether they emerge as meaningful subcomponents of meaning. Also, we wanted to test whether they are related to self-reported meaning in life judgements.

b) To see whether sense of control (the feeling that we control important outcomes), self-esteem (the perception that we are worthy and valuable) and sense of belongingness (the sense that we belong and are connected to others around us) all predict perceptions of meaning in life, and whether they differentially predict the three subcomponents.

c) Because we ran the study at three different time points (each one about 2 weeks apart), we can trace different meaning trajectories and determine which of our predictors affect meaning scores across time.

In the event that the study has raised any distressing issues, we encourage you to seek help from a friend, family member, doctor, counsellor, support group, or other source that you see as appropriate.

If you have any further questions or concerns about the study, please contact Vlad Costin at v.costin@sussex.ac.uk

APPENDIX 4

Paper 4 questionnaire materials

Intro and consent
Belief systems study

 People hold beliefs, attitudes, opinions and values through which they interpret the world around them. As such, we would like to find out your views on a number of topics ranging from political orientation and religion to more particular issues such as abortion and capital punishment. For each of these topics you will be shown a list of statements and you will have to choose the one that best describes your position with regards to that issue. Then you will be asked how much you agree or disagree with a series of statements related to each of your selected beliefs. The whole study is expected to take no longer than 30 minutes. **There are no right or wrong answers; we would simply like to know what you think. Also, don't spend too long on any one item; often, the first answer that comes to mind is the best.**

 Giving consent

 Your participation is voluntary and you are free to withdraw from the study without giving an explanation. All data we collect from you will be treated as confidential and will only be accessed by the research team. You can withdraw your data from the study at any point before MTurk payment has been processed. At the end of the study, you will be debriefed and the aims and purposes of our research will be fully explained.   The results of the study will be written up for my PhD thesis and for academic papers that may be submitted for publication. No identifiable information will be used in the write-up.   This study has been approved by the Sciences & Technology Cross-Schools Research Ethics Committee (crecscitec@sussex.ac.uk). The project reference number is ER/VC69/5. The University of Sussex has insurance in place to cover its legal liabilities in respect of this study.   By clicking the box

below and clicking next, you acknowledge that you are over 18, have read and

understood the information above, and consent to take part.

☐ I agree

Demographics
Your gender:

◯ Male

◯ Female

◯ Other (please specify)
_____

Your age

_____

Your sexual orientation:

◯ Heterosexual or straight

◯ Gay or lesbian

◯ Bisexual

◯ Other _____

Your relationship status:

○ not in a relationship

○ married

○ separated

○ in a committed relationship

○ divorced

○ widowed

○ other (please specify)
_____

Your nationality

_____

What is your ethnic group?

_____

Are you currently pursuing a University degree (Undergraduate, Masters, PhD etc.)?

If you have answered 'Yes', please specify your course:

○ Yes _____

○ No

Your employment status:

▼ Full-time employee ... Not employed / Student / Retired

Think of this ladder as representing where people stand in your country. At the top of

the ladder are people who are the best off, those who have the most money, most

education, and best jobs. At the bottom are those who have the least money, least

education, and worst jobs or no job.

Please select the number of the rung that best represents where you think you

stand on the ladder.

▼ 10 ... 1

Your religion:

○ Atheist

○ Agnostic

○ Christian

○ Jewish

○ Muslim

○ Hindu

○ Buddhist

○ Other _____

Instruction

On each of the next few pages, there is a set of statements about a particular issue, or a set of values. On each page, you will be asked to choose an option that best reflects your system of beliefs, or set of values.

For some of these items you will have the option to type a statement of your own if you feel that the ones provided do not reflect your views; this can be anything that you see as related to the respective topic. Where this option is not available, please choose the option from the ones provided that you find most appealing.

Equality in society

Equality in society

Please choose one of the statements below. Or if none of these reflect what you believe, please select the 'Other' box and write a statement there.

○ It's a good thing that certain groups are at the top and other groups are at the bottom

○ We would have fewer problems if we treated different groups more equally

○ Success depends more on the circumstances into which one is born than hard work

○ By working hard one can overcome most obstacles that life presents and make his or her own way in the world

○ Other _____

Morality

Morality

Please choose one of the statements below. You might endorse more than one of the

positions below, please chose just one statement that you feel most drawn to.

○ One should avoid causing physical or emotional harm to others

○ One should not treat some people differently than others; all people's rights
need to be respected and they should be treated fairly

○ One should be loyal and place the interests of the group above one's own

○ One should fulfill his or her duties and show respect for legitimate authorities

○ Traditions should be upheld as they serve important roles within one's
community

○ When one makes moral judgements, one must also consider whether things
rise to standards of purity and decency

Abortion

Abortion

Please choose one of the statements below. Or if none of these reflect what you

believe, please select the 'Other' box and write a statement there.

○ Abortion should be legal and readily accessible to people requesting it

○ To protect the rights of the unborn baby, legal abortion should never be
available

○ Abortion should only be allowed only in case of rape, incest, or life-
threatening situations

○ Other _____

Death penalty

Death penalty

Please choose one of the statements below. Or if none of these reflect what you

believe, please select the 'Other' box and write a statement there.

   ○ A murderer deserves to die

   ○ Capital punishment is absolutely never justified

   ○ Capital punishment is necessary for some crimes

   ○ Other _____

Personal values

Personal values

Below are a set of values that people might see as guiding principles. Please choose

the one that you find most appealing.

○ POWER (social power, authority, wealth)

○ ACHIEVEMENT (success, capability, ambition, influence on people and events)

○ HEDONISM (gratification of desires, enjoyment in life, self-indulgence)

○ STIMULATION (daring, a varied and challenging life, an exciting life)

○ SELF-DIRECTION (creativity, freedom, curiosity, independence, choosing one's own goals)

○ UNIVERSALISM (broad-mindedness, beauty of nature and arts, social justice, a world at peace, equality, wisdom, unity with nature, environmental protection)

○ BENEVOLENCE (helpfulness, honesty, forgiveness, loyalty, responsibility)

○ TRADITION (respect for tradition, humbleness, accepting one's portion in life, devotion, modesty)

○ CONFORMITY (obedience, honoring parents and elders, self-discipline, politeness)

○ SECURITY (national security, family security, social order, cleanliness, reciprocation of favors)

Free will / determinism

Free will / determinism

Please choose one of the statements below. Or if none of these reflect what you

believe, please select the 'Other' box and write a statement there.

○ One has complete control over the decisions one makes; one can overtake
any obstacles if they truly want to

○ One could have free will even if scientists discovered all of the laws that
govern all human behavior

○ Every event that has ever occurred, including human decisions and actions,
was completely determined by prior events

○ Life is hard to predict because it is almost totally random; what happens to
people is a matter of chance

○ Fate determines one's successes and failures

○ Other _____

Human nature

Human nature

Please choose one of the statements below. Or if none of these reflect what you believe, please select the 'Other' box and write a statement there.

○ Powerful people tend to exploit others

○ The only way to get ahead is to take advantage of others

○ People are inherently generous and kind-hearted

○ Most people mean well and can be trusted

○ Other _____

Relationships to important others

Please think of two people who are important to you and provide each of their names below.

.

Name of person 1 (e.g. Jane)

Name of person 2 (e.g. Sam)

Relationships to important others 2

Please complete the sentences below by specifying **who you are in relation to each of the important people** that you've named on the previous page. E.g. If Sam is your son the write "I am Sam's *mother"*

.

I am **[piped text]'s** _____

I am **[piped text]'s** _____

Instruction 2

Thank you for your answers so far. You are now halfway through the questionnaire. The next questions refer back to some of the answers you have just given. Use the scales provided to respond to each of the following statements. [I just included an example of each type of instruction used, i.e., value, belief, identity; the other ones are identical except for stating the corresponding meaning framework domain, e.g., morality, human nature]

Sources - Equality

Equality in society

You said that [piped text]

How important is this to you personally?
[Anchors: *Not at all important (1) to Extremely important (5))*]

Please use the scales below to indicate how much you agree or disagree with the following statements.
[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

Believing that [piped text] makes me think that life is objectively meaningful
Believing that [piped text] makes me feel a sense of meaningfulness in my life.

Regardless of your belief that [piped text], please select strongly disagree from the options below:

Believing that [piped text] makes me feel:

A sense of purpose and direction in my life.

A sense of order and coherence in my life.

That my life matters in the grand scheme of things.

Believing that [piped text] makes me feel:

Positive about myself.

Included with others.

Competent.

A sense of control.

Distinctive.

Connected to my past and my future.

Sources - Personal values

Personal values

From a list of values, you selected [piped text]

How important is this to you personally?

[Anchors: *Not at all important (1) to Extremely important (5))*]

Please use the scales below to indicate how much you agree or disagree with the

following statements.

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

Valuing [piped text] makes me think that life is objectively meaningful

Valuing [piped text] makes me feel a sense of meaningfulness in my life.

Regardless of your belief that [piped text], please select somewhat disagree from the

options below:

Valuing [piped text] makes me feel:

A sense of purpose and direction in my life.

A sense of order and coherence in my life.

That my life matters in the grand scheme of things.

Valuing [piped text] makes me feel:

Positive about myself.

Included with others.

Competent.

A sense of control.

Distinctive.

Connected to my past and my future.

Sources - Important others person 2

Being [piped text] **'s** [piped text]

How important is this to you personally?

[Anchors: *Not at all important (1) to Extremely important (5))*]

Please use the scales below to indicate how much you agree or disagree with the following statements.

[Anchors: *Strongly disagree (1) to Strongly agree (7))*]

Being [piped text] **'s** [piped text] makes me think that life is objectively meaningful

Being [piped text] **'s** [piped text] makes me feel a sense of meaningfulness in my life.

Being [piped text] **'s** [piped text] makes me feel:

Being [piped text] **'s** [piped text] makes me feel:

Debrief

Thanks you for participating!

Your validation code is:

${e://Field/mTurkCode}

To receive payment for participating, enter this validation code in the Mechanical Turk window, then click "Submit".

What the study was about

Meaning frameworks are complex webs of propositions that people hold about how things are (or should) be in the world. It has been speculated that meaning frameworks can create a sense of meaningfulness to the extent that they contribute to the three proposed dimensions of meaning in life: coherence, purpose and significance. We predict that a meaning framework that more strongly contributes to all three meaning dimensions will also be rated as most meaningful. Additionally, we selected four other psychological constructs that have been identified in previous research as sources of meaning: control, belongingness, self-esteem and competence. We aim to assess whether people's experience of meaningfulness is contingent upon any of these four. In that case, that would suggest the need to consider additional dimensions of meaning.

If you have any questions or concerns about this research, please contact Vlad Costin at v.costin@sussex.ac.uk