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Revisiting Cognitive Dissonance: A Closer Look at the Core Assumptions of a Classic Theory

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Abstract

Cognitive dissonance is a well-established and highly cited psychological theory. However, many of its basic assumptions have come under recent criticism concerning methodological design, variable manipulation, and measurement of dissonance as a unique psychological phenomenon distinct from general negative affect. A within-subjects design compared measures of dissonance-related affect at baseline to the same affect measures across varying magnitudes of belief-behaviour inconsistency via a counter-attitudinal task. The study also measured belief change in response to dissonance conditions and explored relationships between dissonance experience and individual difference variables (extraversion, religiosity, and political orientation). Results did not support an increase of dissonance relative to baseline, nor change in belief following dissonance induction. Additionally, dissonance was unrelated to religiosity and extraversion, but associated negatively with conservative political orientation. Findings suggest alternative motivations other than psychological discomfort or negative affect for belief change in classic dissonance paradigms.

Keywords

Cognitive Dissonance, Belief Change, Social Psychology, Belief-Behaviour Inconsistency, Dissonance Thermometer, Affect Measurement

Summary for Lay Audience

Cognitive dissonance describes a motivational process where, upon becoming aware of an inconsistency between attitudes or an attitude and behaviour, an individual experiences psychological discomfort and is compelled to devise a strategy to reduce or eliminate the discomfort. This theory lies at the heart of research on attitude and behaviour change and has been a cornerstone of social psychology for over six decades. Although numerous studies have used the theory to promote positive behaviour, develop effective health interventions, and form predictions on why and when attitudes and behaviours may change, some of the basic assumptions have been taken for granted. This study aimed to address recent criticisms of the theory in order to strengthen the body of work and contribute to a more theoretically sound basis upon which to apply cognitive dissonance in real-world settings.

Specifically, this work sought to investigate the assumptions that the mere presence of a belief-behaviour inconsistency triggers an onset of cognitive dissonance, that this dissonance would increase as the intensity of the inconsistency increases, and that belief change would be associated with the experience of cognitive dissonance. Participants in the study wrote persuasive paragraphs that varied in their consistency with their prior beliefs on several topics. Dissonance-related emotions were measured following paragraphs written that strongly contradicted their prior beliefs, strongly aligned with their prior beliefs, and that neither explicitly aligned nor contradicted their beliefs. Personality, religiosity, and political orientation were investigated as possible factors that may have affected dissonance experience.

Contrary to the claims made by previous research, I found no evidence for belief-behaviour inconsistency as a trigger for dissonance-related feelings or belief change as an indicator that dissonance had occurred. These findings contradict the assumptions regarding dissonance onset and belief change in response to dissonance, suggesting further work is necessary to clearly understand the dissonance process.

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Chapter 1

1 Introduction

The theory of Cognitive Dissonance claims that when a person recognizes a conflict between some aspect of their beliefs/thoughts and their behaviour, they experience unpleasant affect. To reduce this unpleasant feeling, they must change either their behaviour or their belief thereby resolving the conflict (Festinger, 1957). Since Leon Festinger completed the first major work on Cognitive Dissonance Theory in 1957, there have been more than 300,000 papers published on this topic (Google Scholar). This idea has become central to the study of attitudes, attitude/behaviour change and motivation, amongst other ideas (Harmon-Jones & Mills, 2019; Cooper, 2019; Vaidis & Bran, 2019). As such, it is a cornerstone theory within social psychology, underpinning both basic and applied research branches. However, scholars have begun to question the validity of this work, due to the presence of several methodological oversights that frequently afflict research in this field (e.g., Vaidis & Bran, 2019).

Because this theory is so central to social psychology, it is important to re-visit basic work in the dissonance literature and address some of these methodological issues. These issues include the presence of small sample sizes – often fewer than 50 participants within a group (Priolo et. al, 2019; Freijy & Kothe, 2013). Small sample sizes are problematic because they limit the degree to which results can generalize (Privitera, 2016), are more vulnerable to extreme values than larger samples (Asendorpf et al., 2016) and can lead to the overestimation of group differences (Asendorpf et al., 2016). To enhance generalizability, sample sizes and sample diversity should be improved.

A second issue in the literature is that almost without exception, cognitive dissonance has been studied in a between-subjects rather than a within-subjects fashion, and very little of this work describes strong double-blinding procedures in the data collection phase (Freijy & Kothe, 2013). Recent evidence shows that experimenter demeanor, especially when an experimenter has knowledge of both expected results and participant condition, can have a significant effect on study outcomes (Doyen et al., 2012; Gilder & Heerey, 2018). In

addition, between-subjects designs rarely allow for repeated measurement of the dependent variable, which can reduce the reliability of measured results (Breakwell et. al, 2020).

Finally, the measurement of the cognitive dissonance state itself has not been well-standardized. Though many studies have described theoretically what the cognitive dissonance state should be like and have inferred this state from various adjacent measures, the observation of real-time dissonance has not been prioritized. This has led to standardized measures of various processes surrounding the dissonance event (e.g., inconsistency as establishing dissonance, attitude change as dissonance resolution [McGrath, 2017; Vaidis & Bran, 2019]), but a considerable neglect in terms of describing specific characteristics of dissonance experience beyond the original (and somewhat vague) characterization as "psychological discomfort" (Vaidis & Bran, 2019).

The aim of the current research is to address these criticisms by re-thinking the design of a common cognitive dissonance paradigm in which participants are asked to write a persuasive essay promoting an idea with which they strongly disagree (i.e., a counter-attitudinal task).

1.1 A Brief History of Cognitive Dissonance

In the 1950s, Leon Festinger developed the theory of cognitive dissonance to explain what happens when individuals experience a conflict between their beliefs and behaviours (or between two contradictory "cognitions" [Festinger, 1957]). The theory claimed that such conflict led to a psychological state called "cognitive dissonance". This state was characterized by feelings of discomfort that people were motivated to resolve by adjusting one of the conflicting elements (i.e., the belief or the behavior) to make it consistent with the other. The process of reconciling the divergent cognitions and/or behaviours served to eliminate both the conflict and the resulting negative psychological experience **(**Festinger, 1957**)**. Such conflict could, for example, take the form of having to decide between two equally attractive (or unattractive) options (Brehm, 1956), performing an action that conflicted with a participant's own moral code or values

(Festinger & Carlsmith, 1959), or having to reconcile a strong commitment to an idea in the face of disconfirming/conflicting evidence (Festinger, 1956).

To test the main claims of the theory, many of the earliest cognitive dissonance experiments asked individuals to perform counter-attitudinal tasks (e.g., Cooper et. al, 1978; Elliot & Devine, 1994; Cancino-Montencinos et. al, 2018). For example, in one famous study (Festinger & Carlsmith, 1959), participants completed a boring task and were then paid either $1 or $20 to lie to the next participant by telling them that the task was interesting. The results of this study showed that participants changed their beliefs to a greater degree after receiving a payment of $1 than after receiving $20. The researchers concluded that the belief change occurred because of discomfort experienced when there was no sufficient incentive for justifying behavior dissonant to participants' beliefs. Thus, when there is no other readily available way to reckon with belief/behaviour inconsistency (e.g., by attributing dissonance behaviour to an enticing incentive), belief change seemed to be the next most accessible strategy.

By the end of the 1950s, research on cognitive dissonance theory had broadly supported the idea that when people are compensated handsomely for engaging in an attitude-inconsistent behaviour, they experience little discomfort because they can justify an attitude-behaviour discrepancy by attributing their behaviour to the remuneration, thereby divesting themselves of responsibility. However, when compensation is perceived to be small, the feelings of discomfort that arise in the context of attitude-inconsistent behaviour must be resolved by attitude change because the responsibility for the behaviour rests with the self (e.g., Festinger & Carlsmith, 1959).

In the years that followed, numerous studies attempted to corroborate and expand on these initial findings, providing both support for the original work and opportunities to refine various aspects of the theory, all the while relying heavily on belief change as a standard outcome measure of both the occurrence and resolution of cognitive dissonance (McGrath, 2017). Similarly, research has shown that participants subjected to discomforting experiences (e.g., hazing) to gain access to an exclusive group or privilege report greater liking of the outcome (e.g., group membership) than do those who receive

the same outcome without the experience of discomfort (e.g., Aronson & Mills, 1959). In addition, researchers have supported Festinger's claim that dissonance operates as a drive-like state (similar to hunger) citing evidence that its presence interferes with performance on learning and memory tasks (e.g., Waterman & Katkin, 1967; Martinie et al., 2010).

Over the next several decades, dissonance research flourished with thousands of articles published across a variety of disciplines, both basic and applied. Ultimately, using different research paradigms, experiments from a number of independent laboratories seemed to demonstrate overwhelming support for the theory. These experiments showed evidence that when faced with a belief-behaviour inconsistency, individuals will experience dissonance and attempt some reduction strategy if two conditions are met: 1) they feel like they freely chose the action, and 2) they attribute the discomfort to the inconsistency (Zanna & Cooper, 1974).

However, despite numerous revisions and extensions of the theory, its main assumptions have remained largely unchallenged. These are 1) that dissonance is a unique psychological state that is induced by exposure to an inconsistency between two strongly believed cognitions or to a belief-behaviour discrepancy, and 2) that dissonance reduction occurs after experiencing an attitudinal or behavioural change that serves to reduce the inconsistency (Festinger, 1957).

Unfortunately, however, research thus far has shown few examples of the presence of this unique psychological state by using multiple measurements to differentiate it from participants' psychological state prior to the dissonance-causing intervention (Cancino-Montecinos et al., 2018; Martinie et. al, 2013). In addition, although there has been some attempt to characterize elements of the dissonance state (e.g., physiological arousal, negative affect; Croyle & Cooper, 1983; Proulx et al., 2012), it remains vaguely characterized as the experience of psychological discomfort (Vaidis & Bran, 2019). Without a precise understanding and operationalization of the emotional experiences that comprise the state of cognitive dissonance, it is difficult to make clear predictions for how it will affect behaviour both inside and beyond the laboratory.

1.2 Flaws in the Literature

In the wake of the replication crisis, researchers are calling for a more thorough revision of many established theories—cognitive dissonance being no exception. Though several flaws have been highlighted recently in the literature (e.g., Vaidis & Bran, 2019), the current study aims to address three key issues in cognitive dissonance research: methodology, measurement, and manipulation.

1.2.1 Issues in Research Methodology

The first major limitation of the current dissonance literature relates to research design concerns. First, much of the research in this field relies upon between-subjects research designs in which participants are randomly assigned to either a condition that induces dissonance or a condition that does not (See Freijy & Kothe, 2013 and Priolo et. al, 2019 for meta-analysis and review). Often this research fails to report either the presence of double-blind designs or the methods by which any double blinding occurred (e.g., Cooper & Feldman, 2020; Voisin & Fointiat, 2013). This is problematic because evidence suggests that researcher knowledge can inadvertently influence participants' experience of the research design as well as the data they produce (Gilder & Heerey, 2018).

Another obvious problem with between-subjects designs is that individual differences in responses to the manipulation are largely unaccounted for, although they likely exist. This can be partially remedied in the analysis stage by controlling for certain variables (but see counter argument by Lakens, 2013). Correlations between dissonance experience and other relevant individual difference variables can also be examined to help researchers understand such issues. However, given the relatively small sample sizes in the current literature, these are unsatisfactory solutions.

Lastly, to our knowledge, few studies in the field of dissonance research document an increase from baseline in the experience of cognitive dissonance in the high-dissonance condition. That is, although differences in cognitive dissonance across task conditions are robust (e.g., Freijy & Kothe, 2013; Priolo et. al, 2019), it is largely unknown how much the high-dissonance condition differs from baseline. This seems to be a critical element of the theory of cognitive dissonance. If the dissonance-eliciting condition does not truly

increase dissonance-related affect, what is responsible for the attitude change? Without attempting to measure changes in this variable over time, it is difficult to know whether the high-dissonance condition increases dissonance, the low-dissonance condition decreases it or both conditions change from baseline. This is a central, and yet unmeasured assumption in the present body of research. The only way to address it is to ensure that participants complete a baseline measurement of affective experience that includes cognitive dissonance experience so that changes in experience can be compared with this baseline condition.

1.2.2 Measurement of the Experience of Cognitive Dissonance

Numerous studies claim to have empirically supported the existence of cognitive dissonance as a psychological phenomenon. However, what many of these studies actually report is the presence of a dissonance reduction strategy (e.g., a change in attitude [McGrath, 2017]), by which the assumption is made that the experience of cognitive dissonance has also occurred (Festinger, 1957). This practice is problematic, as there are many possible causes for attitude change (and other dissonance reduction strategies) in any given context. Additionally, measuring outcome variables like dissonance reduction does not reveal anything about the nature of dissonance state itself (e.g., its specific magnitude or affective experience) except that it has, in theory, motivated the measured outcome. When researchers rely on external cues to infer states of dissonance and the resolution thereof, there is a loss of information about dissonance as a unique construct, as well as dissonance as a psychological state that can be measured and potentially used as a tool to improve both individual and social behaviour (e.g., Chiou, 2006; Freijy & Kothe, 2013; Stone et al., 1994).

In accord, several researchers have expressed the need for a standardized measure of cognitive dissonance (Devine et. al, 1999; Vaidis & Bran, 2019). Without standardization of both scales and implementation (i.e., standardized instructions, scoring), the measurement and description of cognitive dissonance as a state becomes imprecise, thus obfuscating the interpretation of data on the induction, reduction, effects, and practical implications of its experience (Vaidis & Bran, 2019). Basic physiological arousal was a popular dissonance measure for some time (Elliot & Devine, 1994), but received the

criticism that it was inadequate as part of the original theory as expressed by Festinger, which explicitly described psychological discomfort as a main driver of dissonance reduction (1957).

Elliot and Devine (1994) addressed this issue with the dissonance thermometer, a tool they developed to measure the state of cognitive dissonance by assessing self-reported affective experience **(**Devine et. al, 1999**)**. As dissonance is often defined as psychological discomfort, the dissonance thermometer appears to be a useful and logical way to assess, via self-report, an individual's subjective experience in response to a theoretically dissonance-inducing situation. According to Elliot and Devine's (1994) research, three out of 24 affect items appear to be sensitive to the presence of a belief-behaviour inconsistency via a counter-attitudinal task. These affect items "uncomfortable", "uneasy", and "bothered", emerged as a "dissonance index" over and above other negative or positive affect items after performing the task and decreased after attitude change, providing some of the first empirical evidence that cognitive dissonance state is specifically characterized by discomfort-related emotions (as opposed to other negative affect items such as guilt, anger, or shame [Elliot & Devine, 1994]). Elliot and Devine (1994) used the dissonance affect items in tandem with attitude change to examine the experience of psychological discomfort during dissonance induction as a motivator of dissonance reduction via attitude change, in contrast to measures of physical arousal that had received disproportionate attention in the prior literature (Elliot & Devine, 1994).

The creation of the dissonance thermometer was a milestone in the dissonance literature, creating a measure of the experience of dissonance that could be used as a consistent tool for future studies. However, it should be noted that while the dissonance thermometer is extremely useful for operationalizing and measuring the experience of cognitive dissonance, it is not without limitations. In particular, explicit self-report measures of affect require both accuracy and honest reporting from participants, both of which can be promoted but not ensured (Martinie et al., 2013; Vaidis & Bran, 2019).

1.2.3 Manipulation of Cognitive Dissonance

The third issue in dissonance research concerns the manipulated variable in much of the literature. In many paradigms (including but not limited to those that require counter-attitudinal behavior), participants are typically placed in one of two experimental conditions: a condition thought to cause dissonance, and a condition thought not to do so (though neutral conditions are occasionally used in addition [Freijy & Kothe, 2013; Priolo et. al, 2019]).

Despite the idea that the manipulation of inconsistency between attitudes and behaviour (or multiple attitudes) should be the central element of a research paradigm in this domain, the dissonance literature is rife with studies where manipulation of this inconsistency as the predictor variable is missing (e.g., van Veen et al, 2009). Instead, in many paradigms, belief/behaviour inconsistency is held constant (e.g., both groups in a study perform the same inconsistent counter-attitudinal task), but the incentive changes ($1 vs $20), the perception of choice changes (being explicitly told that they may refrain from the task vs being told they must complete the task), or the source of discomfort changes (being given [or not] a pill that is supposed to enhance arousal in the task so that the interpretation of the discomfort may be attributed to something other than the inconsistency [Vaidis & Bran, 2019]).

This is problematic for several reasons. The first is that failing to manipulate the consistency between belief and behaviour may lead to erroneous conclusions (e.g., some other aspect of the manipulation may cause the outcome). A key part of understanding the nature of cognitive dissonance (e.g., its onset, development, subjective experience, resolution, and broader implications) is understanding the specific circumstances under which it occurs. Festinger's original claims indicate that inconsistent cognitions are at the heart of the dissonance process, so to have a wide body of literature about the theory in which little research manipulates inconsistency as the variable of interest is concerning.

Without a basic manipulation of inconsistency, (e.g., inconsistency type, salience, and magnitude) it is difficult to make conclusions about how and why dissonance occurs or its effects because a clear and detailed description of the central theoretical dissonance

trigger is absent. More research that specifically manipulates attitude-behaviour discrepancy is needed. Moreover, a research design that examines the effects of such discrepancy manipulations within a given participant would provide strong evidence for testing how and why changes in dissonance experience motivate the outcome variable (e.g., belief change).

Another reason that the lack of inconsistency manipulation is problematic, is that without isolating inconsistency as a variable apart from all other moderating factors, it becomes unclear as to how much unique variance in dissonance is accounted for by the inconsistency. Having a standard practice for inconsistency measurement and manipulation would allow for a better understanding of the role of other moderating variables. For example, Joel Cooper's New Look model of dissonance (2019) summarizes these moderating variables as the "but onlys" (page 4). According to this idea, dissonance consistently occurs when there is inconsistency between belief and behaviour, *but only* if participants feel as though they have a great degree of choice; *but only* if they are they are incentivized so poorly that they have no internal justifications for their unethical actions; *but only* if they cannot attribute their physiological arousal (or discomfort) to external sources (Cooper, 2019).

What the author's assessment, and much of the research to date, fails to account for is the *but only* concerning the key variable. That is, research typically assumes that if all the moderating conditions are met, then dissonance occurs. However, to document this idea strongly, the experience of dissonance should scale with the degree of belief-behaviour inconsistency. Assessing how changes in the level of inconsistency affect dissonance experience is an important step in understanding the dissonance process and should be undertaken. Without this, results concerning any other moderating variable may very well be meaningless.

In addition to the issues above, the current literature reports very little concerning individual differences that may affect how cognitive dissonance emerges across conditions, though there have been studies that describe possible cultural factors that may explain variation in dissonance at the group level (Hoshino-Browne, 2012; Hoshino-

Browne et al., 2005). However, it is important, especially in the context of individual intervention strategies involving dissonance, that factors relating to personality and worldview (e.g., religiosity and political orientation) are considered— factors that may vary across populations (Saucier et al., 2015). For example, previous studies have used the HEXACO-60 to assess personality traits and proneness to dissonance-related affect such as guilt and shame (Ashton et al., 2014). Previous literature has also suggested that cognitive dissonance effects may be reduced in individuals high in extraversion in counter-attitudinal dissonance paradigms (Matz et al., 2008).

1.3 Current Research

The current study aimed to address each of these issues first by using a repeated-measures design in which affective experience is measured (including positive affect, negative affect, and the experience of cognitive dissonance) at baseline and again at each of three belief-behaviour discrepancy conditions.

I used Elliot & Devine's dissonance thermometer as a starting point, mitigating the limitations of self-reported affect by using a sliding scale anchored at 0 and 100, which allowed for more nuanced differences in affect measurements across conditions. Additionally, these affect measures were also collected intermittently throughout the course of the study, allowing for both a baseline (pre-manipulation) measure of affect, and a within-subjects comparison of dissonance in response to varying conditions. To reduce demand characteristics related to reporting negative affect (Nichols & Maner, 2008), the study was framed as an investigation of the effect of writing on emotions and explicitly informed participants that affect would be measured several times during the study (i.e., each time they wrote a paragraph). To disguise the presence of the dissonance thermometer, the specific dissonance items were randomly embedded within a larger affect measure (the Positive and Negative Affect Schedule; Watson et. al, 1988), thereby reducing the likelihood that participants would guess what was being assessed. Including the additional affect items also provided insight into how negative and positive affect change directionally relative to one another in response to the varying conditions.

Second, I addressed the manipulation issue by using one dimension of inconsistency—magnitude—as the independent variable and adjusting this magnitude within participants (task conditions include high belief-behaviour inconsistency, medium belief-behaviour inconsistency, and low belief-behaviour inconsistency). I first measured participants' beliefs about a number of topics, then asked them to write persuasive paragraphs about one they disbelieve strongly (high inconsistency), one they believe strongly (low inconsistency) and one for which they hold no strong opinion (medium inconsistency). Because this study was fully computer controlled, these topics could be calibrated for each participant based on their own specific beliefs. The computer presented the statements in random order to minimize order effects. This procedure allowed me to determine how the dissonance experience changes as the degree of inconsistency changes and how it relates to belief or attitude change. By doing this, I could then verify (or fail to verify) the claim that dissonance is sensitive to inconsistencies of varying magnitude while simultaneously gathering information about a possible critical threshold for which dissonance either begins or ceases to occur (or increase).

Finally, I recruited a large sample of participants to attempt to address issues related to small sample sizes. Together, this work allowed me to examine the experience of cognitive dissonance while controlling for several confounding variables in the literature.

The following specific hypotheses are examined:

1) Hypothesis 1:
    a. Consistent with the literature, the experience of cognitive dissonance will decline across conditions as the magnitude or intensity of the inconsistency declines.
    b. Consistent with the literature, participants will experience strong cognitive dissonance when in the high inconsistency condition (i.e., when asked to write a counter-attitudinal argument) that represents an increase in cognitive dissonance experience relative to a baseline measure.
2) Hypothesis 2:
    a. Consistent with the literature, belief change will decline across conditions as dissonance experience declines. Specifically, there will be less belief

change in the lowest belief-behaviour inconsistency condition, relative to the high belief-behaviour inconsistency condition.

   b. Consistent with the literature, belief change will be positively associated with dissonance experience, such that a greater magnitude of dissonance experience in any given condition will be correlated with greater magnitude of belief change.

3) Hypothesis 3: Individual differences in cognitive dissonance experience will emerge, such that extraversion, along with conservative religious and political beliefs will be associated with less dissonance.

Chapter 2

2 Methods

All research was conducted with approval from the Western University Non-Medical Research Ethics Board (see Appendix A for certificate of approval).

2.1 Participants

Two hundred and ninety-one psychology students were recruited from an undergraduate research participation pool for a study of the "effects of persuasive writing on mood". An a priori power analysis was conducted using G*Power 3.1 (Faul et al., 2009) to test the difference between three measures of the dependent variable using an analysis of variance, small effect size (f = .10), an alpha of .05 (Priolo et. al, 2019). Although, results showed that a total sample of n = 259 was required to achieve a power of .95, I oversampled in anticipation of deleting incomplete or unusable data. Because of the nature of the writing requirement and the fact that the study took place online in an unsupervised manner, I anticipated the loss of approximately 50 to 75 participants during the study due to attrition, inattentiveness and/or failure to follow task instructions. Participants received partial course credit for their time.

Before analyzing the data, I excluded participants who had more than 20% missing data (N= 5). The remaining 286 participants had an average of 1.1% missing data (SD = 2.6%). Additionally, participants who failed two or more attention checks (N=4) or failed to follow task instructions in writing the paragraphs (i.e., they wrote about why the idea was false and not true as instructed or pasted in random text from elsewhere; N=42) were excluded. The final sample included 240 participants with complete and verified data. Of these, 71% identified as female, 20% as male, and 9% chose not to report. Participants ranged in age from 17 to 40 years of age (mean = 18.20, SD = 1.71).

2.2 Procedure

The experiment was conducted entirely online using the Qualtrics survey platform (www.qualtrics.com). It began with a brief demographic questionnaire, including several

items assessing religiosity and political orientation, as previous literature has suggested that both factors may be associated with the experience of cognitive dissonance (Burns, 2006; Forstmann & Sagioglou, 2020).

To assess religiosity, I adapted questions from the most recent (2018) version of the Canadian General Social Survey – Caregiving and Care Receiving (GSS). These questions were intended to provide a general assessment of religiosity as measured by personal religious affiliation, personal importance of religious or spiritual beliefs (measured on a 5-point scale from "not at all important" to "extremely important), and frequency of participation in meetings/services and/or practices associated with religious or spiritual beliefs (measured on a 5-point scale from "Not at all" to "at least once per week"). Cronbach's Alpha showed good reliability for the religiosity measure (3 items; α = .88). I assessed political orientation using a 7-point single-item measure ("To what extent do you identify as liberal or conservative on both social and economic issues?") that ranged from "Very liberal" to "Very Conservative" (see White et al., 2020).

To start the study, audio-recorded task instructions introduced the procedure and informed participants that they would be asked to write several short persuasive paragraphs on psychology-related ideas, followed by a mood inventory and a short questionnaire after each. Participants then completed a baseline measure of mood. I measured mood (and cognitive dissonance) using an adapted version of the Positive and Negative Affect Scales (PANAS; Watson, Clark & Tellegen, 1988). The PANAS is a 20-item self-report measure of positive and negative affect intended to provide brief, reliable, and independent measures of positive and negative mood (Crawford & Henry, 2004). Participants completed the items in random order on a 100-point Visual Analog Scale anchored with "not at all" and "extremely" by adjusting a slide bar with their mouse. In the present sample, Cronbach's Alpha showed good reliability for both scales (PA: α = .88; NA: α = .90). Importantly, the presence of the PANAS allowed me to conceal the measurement of cognitive dissonance.

To measure dissonance experience, I included six additional items taken from the dissonance thermometer (Devine et. al, 1999). Three of the six items corresponded

specifically to dissonance related affect (“uneasy”, “bothered”, “uncomfortable”; $\alpha = .82$; Elliot & Devine, 1994) and the remaining three items were positive affect items (“energetic”, “optimistic”, “happy”). These positive items were included to ensure an equal number of positive and negative affect items to avoid response bias. Thus, the measure had a total of 26 items, 13 assessing positive affect and 13 assessing negative affect. The items were re-randomized each time participants completed this measure. The modified affect measure allowed the repeated assessment of cognitive dissonance without alerting participants to the true purpose of the measure (for similar procedures, see Harmon Jones, 2000).

After the initial mood measure, participants rated how much they believed each of a series of psychology statements (e.g., “Subliminal messages can be used to persuade others to purchase products.”, “Most people use only 10% of their brains.”; Gaze, 2014). Although each of the statements is a commonly believed psychology-related myth, participants were not informed of this at the start of the study. They made their belief ratings on a 7-point scale from “Definitely False” to “Definitely True”, with the mid-point labeled “No strong belief either way”.

After rating the items, participants completed the 60-item self-report HEXACO Revised Personality Inventory (HEXACO-60; Lee & Ashton, 2009, 2018) to both explore the relationships between the experience of cognitive dissonance and personality factors (e.g., Al Otaibi, 2012), and to provide an interim task between the belief ratings and the experimental manipulation.

The HEXACO assumes a 6-factor personality structure including extraversion (“I prefer jobs that involve active social interaction to those that involve working alone.”), agreeableness (“I tend to be lenient in judging other people.”), openness to experience (“People have often told me that I have a good imagination.”), emotionality (“I sometimes can’t help worrying about little things.”), conscientiousness (“I always try to be accurate in my work, even at the expense of time.”), and honesty/humility (“I wouldn’t use flattery to get a raise or promotion at work, even if I thought it would succeed.”). Participants indicated their level of agreement with each statement on a five-

point Likert scale ranging from “strongly disagree” to “strongly agree”. Three attention check items were inserted at random points within the HEXACO and participants completed the items in random order. In the present sample, Cronbach’s alphas for the HEXACO subscales ranged from .74 to .79.

Following the personality inventory, participants wrote a short essay about each of three psychology-related ideas that they had previously rated. Unbeknownst to participants, the computer selected these topics based on their own ratings of the degree to which they believed the items. Using purpose-written JavaScript code embedded in the survey, the computer selected their most strongly believed myth, the most strongly disbelieved myth, and a myth that they rated as being closest to the center of the belief scale (i.e., neither strongly believed nor strongly disbelieved). When there were multiple items that had target ratings (e.g., strongly disbelieve), the computer selected one at random from amongst the set.

Participants were then asked to spend about 10 minutes writing a paragraph intended “to persuade another student that the statement is true”. Participants typed their paragraphs directly into a text box on the screen. After 6 minutes, a button on the screen appeared allowing them to advance to the next page. There was no “upper” limit to the time they could spend on the paragraph. On average, participants spent 8.76 minutes (SD=3.57 minutes) on each paragraph. Participants wrote about the items in random order.

After each paragraph, they responded to two items answered on a 5-point scale from “Strongly Disagree” to “Strongly Agree”: “I was familiar with the idea I just wrote about prior to completing the writing exercise” and “I believe that the idea I just wrote about is psychological fact”. They also completed the mood measure (see above), followed by a responding to the question “Were you satisfied with the paragraph you wrote on this topic?” on a 5-point scale from “Not at all” to “Extremely”.

Following the final paragraph and ratings, the computer informed participants that all of the statements they had written about were false. Participants were then debriefed using a “funnel style” debriefing (Bargh et al., 1996) wherein they answered a series of open-ended and partially open-ended probing questions that asked, with increasing detail,

about the extent to which participants understood the purpose of the study (e.g., “What did you think the purpose of the study was”, “Did you notice anything about the psychology information you were asked to rate?”). Participants also answered questions about the degree to which they understood that the purpose of the study was to examine cognitive dissonance, and how surprised they would be to learn that all the items they wrote about were false (measured on a 5-point scale from “Not at all surprised” to “Extremely surprised”), and how much they still believed each of their three chosen statements to be true after learning that each item they wrote about was false (measured on a 100-point Visual Analog Scale anchored with “not at all” and “extremely”; for a full list of items, questionnaires, and task instructions, see [OSF]).

Participants were then fully debriefed and given a final opportunity to withdraw consent before submitting their data.

2.3 Data Analysis Methods

Figure 1 shows participants’ average belief in each paragraph topic as measured before the writing task. Notably, it shows that the algorithm used to select writing topics for each of the belief-behaviour inconsistency conditions functioned as intended, generating excellent separation of reported belief levels across the conditions. This is an important pre-condition

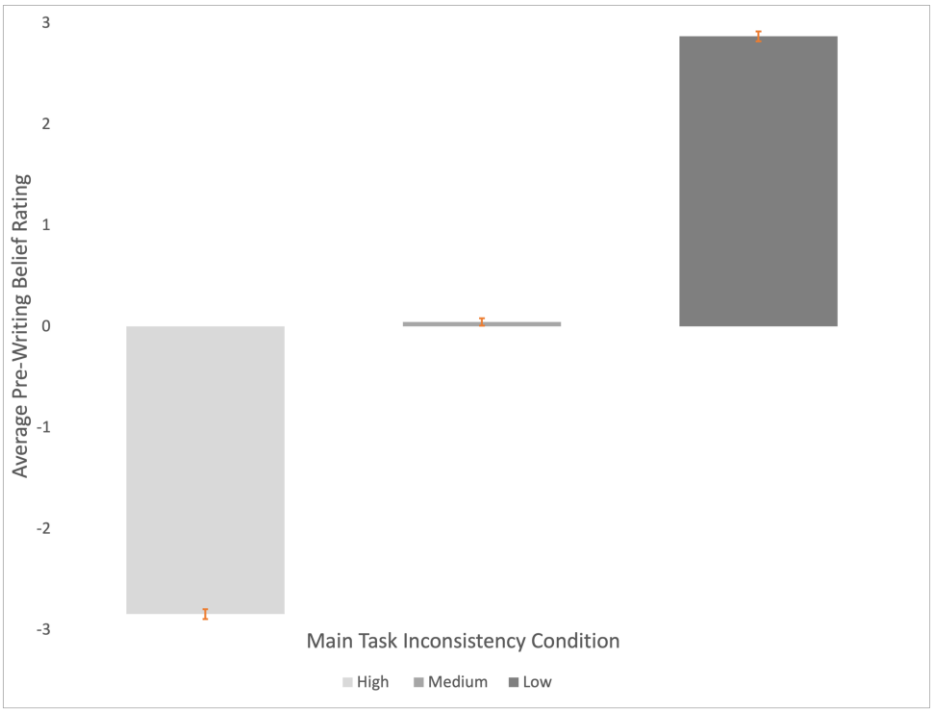

Figure 1. *Average pre-writing belief scores.* Participants generally reported strongly believing the topic in the low belief-behaviour inconsistency condition, and strongly disbelieving the high belief-behaviour inconsistency condition. Error bars show the 95% CI.

for any hypothesis testing in this task protocol, as it shows that any effects (or lack thereof) associated with the differences between writing conditions cannot be explained by lack of variance (e.g., floor or ceiling effects) in participants' belief ratings across the conditions.

Hypothesis 1A

The first hypothesis (H1A) concerns validation of early cognitive dissonance studies, where dissonance, characterized as psychological discomfort, is expected to be present in a high-inconsistency condition, and negligible (if not, absent) in a low-inconsistency condition. I had predicted a significant linear relationship across the belief-behaviour inconsistency conditions in terms of how much discomfort participants would report experiencing, with significantly less dissonance in the low belief-behaviour inconsistency condition than in the high belief-behaviour inconsistency condition. To test this hypothesis, I conducted a repeated measures analysis of variance using belief-behaviour inconsistency condition (low, medium, and high) as the within-participants independent variable. I computed an average "cognitive dissonance" score for each participant within each condition using the three items from Elliot and Devine's dissonance thermometer (1994), measured just after writing the relevant paragraph. These scores became the dependent variables in this analysis. A significant omnibus test triggered a set of post-hoc comparisons to examine differences across the conditions. These were Bonferroni-corrected to control experiment-wise Type I error.

Hypothesis 1B

One significant but untested assumption in the cognitive dissonance literature is that when participants experience a high level of belief-behaviour inconsistency, the experience of cognitive dissonance *increases*. This suggests that in the high belief-behaviour inconsistency condition, participants should experience more dissonance than they do before any manipulation. Conversely, one might imagine that the low belief-behaviour inconsistency condition might generate less cognitive dissonance relative to baseline due to the high levels of belief-behaviour coherence. H1B examined this

assumption. To conduct this analysis, I computed a baseline-centered score for each participant in each condition by subtracting the baseline dissonance score from the dissonance score for each of the high, medium, and low inconsistency conditions. Based on this procedure, positive values indicate an increase in cognitive dissonance experience relative to baseline and negative values indicate a decrease. I then performed a set of one sample t-tests (against a test-value of 0) for each of the conditions.

Hypothesis 2

My second hypothesis (H2A) concerned the verification of another element of the original dissonance theory—the idea that the experience of cognitive dissonance motivates an individual to reduce their discomfort in the face of belief-behaviour inconsistency by, in this case, attitude change (Festinger, 1957). Given that attitude change is a widely used measure of dissonance—indeed, the fact that it has occurred is often taken as evidence for the presence of dissonance (e.g., Breithaupt et. al, 2020; Harmon-Jones, 2000)—I corroborated this idea by comparing participants' level of belief in each statement immediately after writing their persuasive paragraphs to their reported belief at the start of the study.

To quantify this change, I computed the number of scale points participants changed from the anchor point of that belief condition. For example, the high inconsistency condition had an anchor point of -3 at the start of the task. That became the anchor for this condition and if a participant increased their belief by 1 scale point, this was coded as 1. Participants who increased their belief in the item by 2 scale points received a score of 2, etc. (see Elliot & Devine, 1994). The other conditions were coded similarly, with belief change quantified as the absolute value of the scale change. I used the absolute value as my change metric because in the low belief-behaviour inconsistency condition, the anchor point was 3 (the highest scale rating). In this case, a participant who rated this topic as a 3, and reported a one-scale-point change in belief after writing their paragraph showed a decrease in the strength of their belief. Thus, I calculated the absolute value of each participants' level of change in belief from the start of the study to just after they wrote the relevant paragraph.

Once these change scores were computed, I compared belief change across conditions using a repeated measures analysis of variance with belief-behaviour inconsistency condition as the independent variable. I predicted that there would be more belief change in the high-inconsistency condition than either the medium or low conditions, given that the highest level of inconsistency should trigger the highest amounts of dissonance-related affect, and consequently belief change. As above, a significant main effect was followed with Bonferroni-corrected post-hoc tests.

In addition, I predicted that the experience of cognitive dissonance would be positively correlated with belief change (H2B). To test this idea, I conducted a correlational analysis to quantify the expectation that greater dissonance should be associated with more belief change.

Hypothesis 3

The final hypothesis was designed to extend this work to understand how several individual-difference variables related to cognitive dissonance experience. I tested three predictions, along with conducting several exploratory analyses. Specifically, I predicted that dissonance experience would relate to religiosity (higher religiosity scores would be associated with less dissonance), political orientation (higher scores on political orientation, indicative of more conservative political beliefs, would be associated with less dissonance), and extraversion (consistent with previous findings [Al Otaibi, 2012; Matz et. al, 2008], higher extraversion scores would be associated with less dissonance).

To test these ideas, I correlated cognitive dissonance experience and the belief change measure in the high belief-behaviour inconsistency condition with the relevant individual difference variables. I selected only this condition for these analyses because this condition is theoretically the most dissonance-provoking, meaning it is likely to generate the strongest effects.

Chapter 3

3 Results

3.1 Hypothesis 1A: Cognitive Dissonance Experience Across Conditions

As predicted, a repeated measures ANOVA with belief-behaviour inconsistency (low, medium, high) as the independent variable and self-reported cognitive dissonance experience as the dependent variable showed that participants experienced different amounts of dissonance affect across conditions, $F(1.936, 236) = 25.537$, $p < .001$; $n^2_p = .098$. Because the assumption of sphericity is violated, ($\varepsilon = .97$), Greenhouse-Geisser corrected results are reported. Bonferroni-corrected post-hoc tests showed that participants experienced significantly more cognitive dissonance in the high belief-behaviour inconsistency condition ($M = 37.88$, $SD = 24.02$ relative to the low ($M = 28.89$, $SD = 22.77$), but not the medium condition ($M = 35.09$, $SD = 23.24$). Likewise, participants reported greater dissonance experience in the medium as compared to the low belief-behaviour inconsistency condition. Figure 2 shows these results. Thus, the present results, which show reductions in

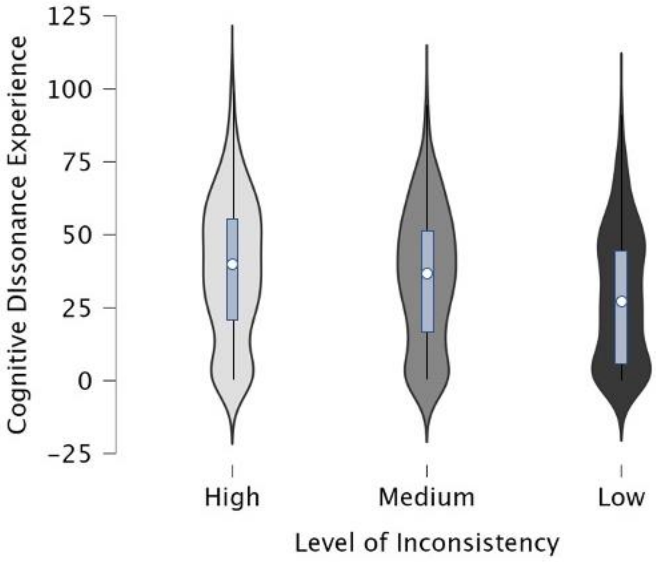

Figure 2 *Cognitive dissonance experience across conditions.* White dots show the median values for dissonance affect items and central boxes show inter-quartile range. The whiskers show the minimum and maximum values in the distributions. Mean differences in cognitive dissonance between high/low and medium/low were greater than the difference between high/medium.

cognitive dissonance across task conditions, are consistent with the previously reported literature (Cooper, 2019; Vaidis & Bran, 2019).

3.2 Hypothesis 1B: Cognitive Dissonance – Inconsistency Conditions vs. Baseline

The experience of cognitive dissonance is not only expected to be higher in a high belief-behaviour inconsistency condition (compared to medium or low), but also be enhanced under this manipulation relative to a baseline measure. That is, according to much of the literature, participants are expected to experience an *increase* in cognitive dissonance in the high belief-behaviour inconsistency condition. Thus, the difference between dissonance experience in the high-inconsistency condition and baseline dissonance experience should be greater than 0. I also tested dissonance scores (relative to baseline) in the other conditions, with the prediction that the low-inconsistency condition might lead to *reduced* dissonance experience, relative to baseline. Surprisingly, a series of one sample Wilcoxon signed-rank t-tests (against a test value of 0) on the baseline centered data revealed that although cognitive dissonance experience decreased relative to baseline

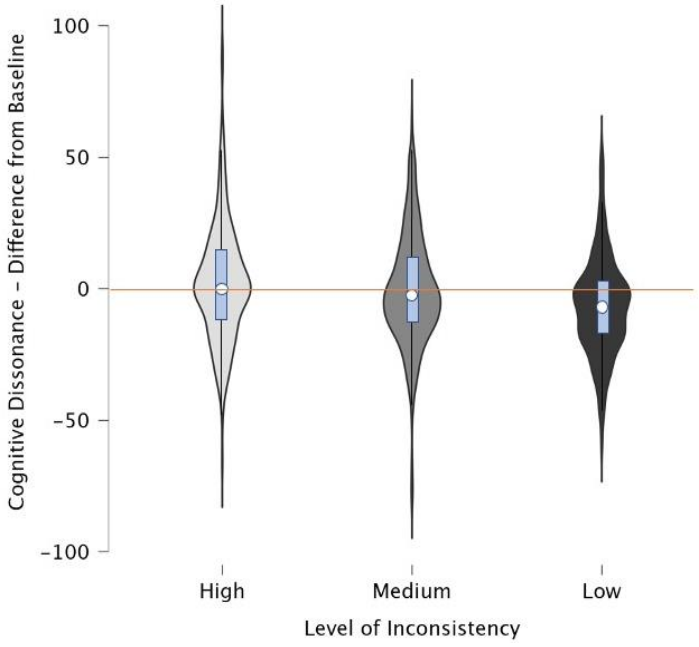

Figure 3. *Cognitive Dissonance Experience Comparisons to Baseline.* White dots show the medians for difference between cognitive dissonance and baseline across conditions. Central boxes show inter-quartile range and whiskers show the minimum and maximum differences from baseline. Baseline-centred mean comparisons show no significant difference in cognitive dissonance experience between baseline and the high inconsistency condition. Comparisons also show a decrease in cognitive dissonance between baseline and the low inconsistency condition.

in the low-inconsistency condition (*M* = -6.90, *SD* = 18.64) there was no increase from baseline in the high-inconsistency condition (*M* = 2.06, *.SD* = 22.01). In the medium condition I found that dissonance experience was also similar to baseline (*M* = -.75, *.SD* = 21.35). Thus, contrary to widely accepted assumptions based on Festinger's original work (1957), participants did not report heightened cognitive dissonance in the high-inconsistency condition. Instead, they reported significantly less cognitive dissonance experience in the low-inconsistency condition (Figure 3).

I have already shown (see Figure 1) that this failure to find an increase in dissonance experience in the high-inconsistency condition cannot be due to ceiling effects or range restriction in participants' belief ratings before the task. One alternate reason that participants might have failed to experience dissonance is that they did not make a serious attempt to write persuasively.

To test this idea, participants' paragraphs were analyzed using the Linguistic Inquiry and Word Count (LIWC-22) software (Boyd et. al, 2022) which examines text passages for a variety of linguistic features. Interestingly, LIWC analyses confirmed that the paragraphs written were persuasive in nature, indicated by high scores for Clout (language of leadership, status; Boyd et.al, 2022) and Analytical Content (metric of logical, formal thinking; Boyd et. al, 2022). Participants also spent comparable amounts of time writing each paragraph, regardless of inconsistency condition (see Table 1). However, post-hoc Bonferroni corrections revealed significant differences in Clout and Analytic scores between some conditions, but not others.

This suggests that while all paragraphs were written thoughtfully, participants appeared to rely more on clout-related language to write persuasively when beliefs were minimally or highly inconsistent with the paragraph (compared to a medium inconsistency), versus using more analytical language to write persuasively when beliefs were minimally or moderately inconsistent with the paragraph (compared to highly inconsistent). Exact statistics for the LIWC analysis are reported in Table 1. Moreover, anecdotal evidence from debriefing responses also confirmed that participants used considerable effort when composing their persuasive paragraphs (e.g., "It was a lot more challenging than I was

expecting … I found it very interesting to have to shift my beliefs as I was writing these paragraphs … doing my best to prove these statements right even though I did not believe them myself"). Thus, it is unlikely to be the case that participants' lack of effort in the task is the reason for this result.

Inconsistency Condition	**Time Spent Writing (secs)**	**Word Count**	**Analytic**	**Clout**
High	516.40 (199.10)	132.64[a] (49.63)	47.82[a] (25.96)	69.29[a] (26.66)
Medium	527.10 (207.00)	126.87[b] (43.04)	55.20[b] (26.51)	63.38[b] (27.71)
Low	534.02 (241.01)	141.49[a] (25.96)	54.10[b] (26.18)	67.03[ab] (24.93)
F(2, 239)	.768 (p=.457)	11.25 (p<.001)	6.81 (p=.001)	3.23 (p=.037)

Table 1 *LIWC Analyses*. Mean LIWC scores and writing duration in each of the belief-behaviour inconsistency conditions for paragraphs written. 'Analytic' and 'Clout' scores represent the percentage of words used in the paragraph that fall into each respective LIWC category. Standard deviations appear in parentheses. The bottom rows of the table report the results of RM-ANOVA comparisons across conditions. Means not sharing superscripts within a variable column differ significantly at α =.05 as indicated by Bonferroni post-hoc tests.

3.3 Hypothesis 2: Belief Change

Hypothesis 2 sought to confirm a commonly used measure of cognitive dissonance, belief change. Theoretically, belief change is evidence of both the occurrence of dissonance and an attempt to alleviate the negative affect associated with dissonance. Thus, in the high-inconsistency condition, I expected to see greater change from the originally reported belief in the high-inconsistency condition than in the other conditions. Furthermore, I expected to see a positive relationship between dissonance and belief change—i.e., the more dissonance experienced, the greater change in belief to alleviate it.

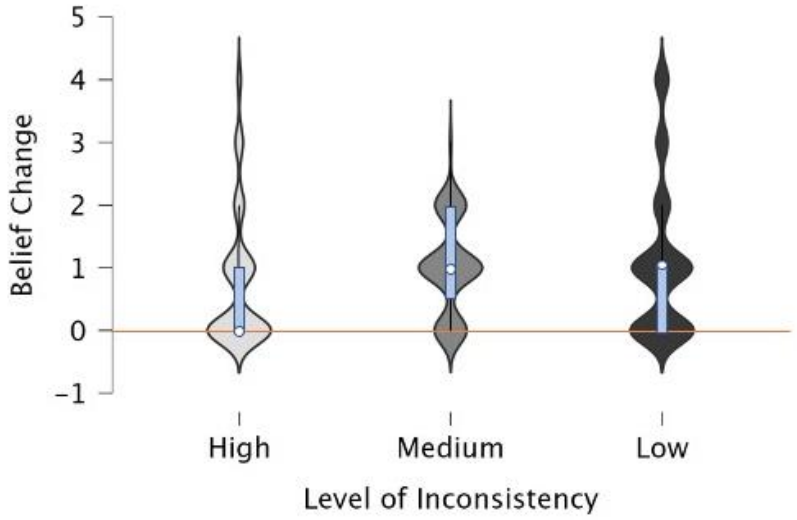

Figure 4. *Belief Change Across Conditions.* Belief change is quantified as the absolute number of scale points moved from the original belief rating. White dots show the median belief change in each condition. values for difference dissonance affect items and central boxes show inter-quartile range. The whiskers show the minimum and maximum values in the distributions (excluding two outliers in the high-inconsistency condition).

When comparing belief change across conditions, a repeated measures analysis of variance revealed that although there was a significant difference in belief change across the conditions [$F(1.834, 238) = 6.72$, $p = .002$; $n^2_p = .027$], this difference emerged in an unexpected way. Instead of the higher levels of dissonance experience in the high belief-behaviour inconsistency condition ([$M = .77$, $SD = 1.05$]; see Hypothesis 1A, Figure 2, above) triggering increased belief change, Bonferroni corrected post-hoc tests showed

that participants in this condition changed their beliefs significantly *less* than did those in the medium inconsistency (M= 1.02, SD = .74) or low inconsistency conditions (M= 1.09, SD = 1.22; Figure 4). Greenhouse-Geiser corrected results are reported due to violation of the sphericity assumption (ε = .92).

In addition, the results of a Spearman's correlation analysis did not support the prediction of a positive association between dissonance and belief change, instead showing a negative correlation between dissonance and belief change in the high-inconsistency condition (Table 2), even when controlling for familiarity with the topic a participant had written about. Table 2 additionally shows the correlations for the other belief-behaviour inconsistency conditions, both with and without the effects of topic familiarity partialled out. Together, these results do not seem to support the idea that the experience of cognitive dissonance motivates belief change in the way the literature has typically assumed.

Level of Inconsistency	**Belief Change x Dissonance**	**Belief Change x Dissonance (Controlling for topic familiarity)**
High	*r(237)* = -.15, (*p* = .020) 95% CI [-027, -0.02]	*r*(237) = -.17 (*p* = .010) 95% CI [-0.29, -0.04]
Medium	*r(237)* = .13, (*p* = .050) 95% CI [7.49e-5, 0.25]	*r*(237) = .13 (*p* =.054) 95% CI [-0.01, 0.26]
Low	*r(237)* = .14, (*p* = .027) 95% CI [0.02, 0.27]	*r(237)* = .03 (*p* = .647) 95% CI [-0.09, 0.14]

Table 2. *Correlations and Partial Correlations Between Belief Change and Cognitive Dissonance.* Spearman's rank correlation (ρ) is reported to show the relationship between belief change and cognitive dissonance in each inconsistency condition. Partial correlations were conditioned on 'familiarity'.

3.4 Hypothesis 3: Individual Differences Related to Cognitive Dissonance Experience

I had predicted that I would see a negative association between cognitive dissonance experience in the high belief-behaviour inconsistency condition and, religiosity, extraversion, and political orientation (in which higher scores indicate more conservative political beliefs).

Contrary to predictions, I found no correlation between religiosity and dissonance experience (r = -0.02, p = .374; Figure 5a). Specifically, dissonance experience was

unrelated to religiosity. Similarly, results failed to confirm previous research (Al Otaibi, 2012; Matz et. al, 2008) suggesting a link between extraversion and dissonance experience. Instead, these variables were not correlated in the present sample (r = -.07, p = .129; Figure 5b).

Interestingly, there was a small but significant negative relationship between the experience of cognitive dissonance and political orientation (r = -.197, p = .001; Figure 5c). Thus, as anticipated, those with more conservative political viewpoints experienced less dissonance in when belief-behaviour inconsistency was high.

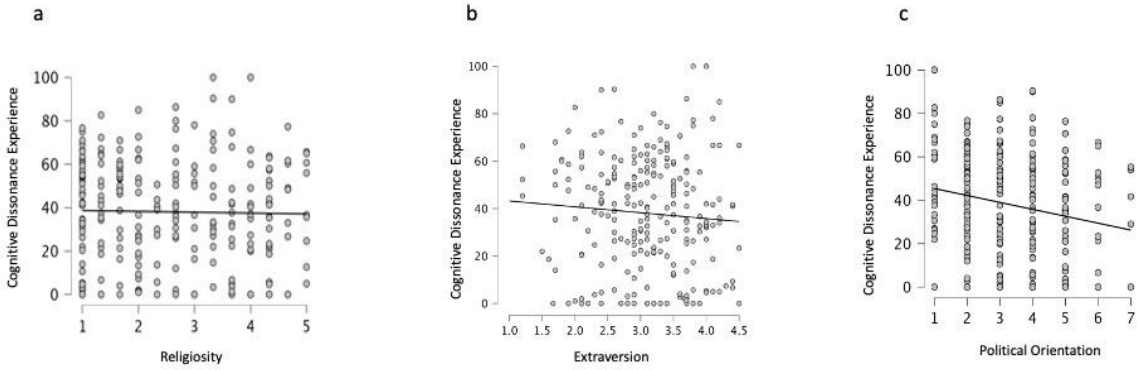

Figure 5. *Correlations Between Cognitive Dissonance and Religiosity, Extraversion, and Political Orientation.* Pearson correlations show relationships between cognitive dissonance experience and a) religiosity, b) extraversion and c) political orientation (higher values indicate more conservative views).

3.4.1 Exploratory Analysis: Correlations with Personality Factors

I also explored the relationships between cognitive dissonance experience and other personality factors (excluding extraversion), as measured on the HEXACO. In the high belief-behaviour inconsistency condition, I found a significant relationship between conscientiousness and cognitive dissonance experience (Table 3), such that those higher in conscientiousness tended to experience less dissonance. However, it is important to

note that these analyses were exploratory in nature and should be verified in new samples prior to drawing strong conclusions.

HEXACO Factor	**Spearman's rho**	**CI 95%**
Honesty-Humility	$r(237) = -.05$, $p = .649$	[-18, .08]
Emotionality	$r(237) = .08$, $p = .224$	[-.05, .20]
Agreeableness	$r(237) = .05$, $p = .432$	[-.18,.08]
Conscientiousness	$r(237) = -.13$, $p = .047$	[-.25, .00]
Openness to Experience	$r(237) = .12$, $p = .073$	[-.01, .24]

Table 3. *Individual Differences in Cognitive Dissonance – Correlations with HEXACO.* Spearman's rank correlation (ρ) is reported to show the relationship between cognitive dissonance and HEXACO personality factors (excluding extraversion, reported above). Correlations above refer only to the high inconsistency condition.

3.4.2 Exploratory Analysis: Verifying the Dissonance Thermometer

An ancillary idea in the cognitive dissonance literature is that the experience of cognitive dissonance is poorly classified (e.g., Vaidis & Bran, 2019). Elliot and Devine's Dissonance Thermometer was developed to provide a standardized measure for cognitive dissonance experience as a solution to this problem (Devine et. al, 1999).

In this study, I used the Dissonance Thermometer to collect repeated measurements of dissonance experience, both associated with manipulation (i.e., immediately after writing each paragraph) and not associated (baseline, end of study). This measure was embedded

in a larger measure of both positive and negative affect (Watson et al., 1988). These data therefore offer a unique opportunity to examine the Dissonance Thermometer items and their relationship to other mood items.

Elliot and Devine (1994) proposed that the three items that make up the cognitive dissonance thermometer were unique in terms of how participants reported experiencing them in the context of a high belief-behaviour inconsistency condition. On that basis, I anticipated that they might load onto a single "negative" factor (along with the rest of the negative affect items) outside the context of the manipulation (e.g., at the baseline and final measures) and that they might show a unique factor loading (i.e., load onto a new factor) in the context of the high belief-behaviour inconsistency condition.

To test this idea and verify the dissonance thermometer, I first conducted a principal components analysis with varimax rotation and a minimum factor loading of .4 to ensure that the 26 items in the mood measure (PANAS plus additional items from Elliot and Devine) used for the current study could reliably be separated into positive and negative affect items. This analysis included mood measurements across all timepoints to ensure the positive and negative factors emerged reliably without dissonance manipulation. Three unique principal components emerged from the PCA (see Table 4). One component comprised of all 13 negative affect items plus one positive affect item (relaxed) that loaded negatively and cross-loaded with the second factor (accounting for 28.1% of the variance), the second component comprised of 11 of the positive affective items (accounting for 18.9% of the variance), and the third comprised of four of the positive affect items, two of which cross-loaded with the second component (accounting for 8.6% of the variance).

	Factor 1	Factor 2	Factor 3		Factor 1	Factor 2	Factor 3
Uneasy	.82			Proud		.77	
Uncomfortable	.79			Strong		.75	
Afraid	.79			Enthusiastic		.75	
Scared	.78			Excited		.73	
Upset	.77			Optimistic		.72	
Distressed	.74			Inspired		.68	
Nervous	.72			Active		.68	
Bothered	.72			Content		.52	
Ashamed	.71			Determined		.49	.56
Irritable	.70			Interested		.48	.52
Hostile	.68			Alert			.73
Guilty	.66			Attentive			.72
Jittery	.60						
Relaxed	-.41	.43					

Table 4. *Principal Components Analysis – All Timepoints*. Factor loadings based on a principal components analysis using varimax rotation for 26 items used as the mood measure.

I then conducted an exploratory factor analysis to examine the extent to which the three items identified in the dissonance thermometer emerged as unique from general negative affect in this study. For the high-inconsistency condition (the condition in which the dissonance index items should most likely emerge as a unique factor), 13 negative affect items were factor analyzed using a principal-axis analysis with varimax rotation (see Elliot & Devine, 1994). Using a minimum factor loading of .6, the analysis yielded a single factor accounting for 51.5% of the variance (See Table 5). All three dissonance

index items loaded onto this factor with nine of the remaining negative affect items, suggesting general negative affect experienced during the high-inconsistency condition.

These factor loadings were subsequently compared to a similar analysis using the same mood measurements taken at times that were unassociated with any manipulation. Contrary to the high-inconsistency condition, I anticipated the presence of a general negative affect factor during the non-manipulation conditions. Consistent with expectations, the analysis of combined pre- and post-manipulation affect measures yielded a single factor accounting for 48.5% of the variance (see Table 6).

	Factor 1
Uneasy	.80
Afraid	.76
Scared	.76
Uncomfortable	.76
Upset	.75
Nervous	.73
Bothered	.70
Distressed	.69
Ashamed	.65
Irritable	.65
Guilty	.62

Table 6. *Exploratory Factor Analysis – Pre/Post Manipulation Conditions.* Factor loadings based on a principal-axis analysis using varimax rotation for 13 negative affect items used as the mood measure in pre- and post-manipulation conditions only. Dissonance items loaded onto a single factor with 8 other negative affect items. Loadings <.6 excluded.

	Factor 1
Uncomfortable	.81
Uneasy	.80
Upset	.78
Distressed	.77
Scared	.76
Afraid	.75
Hostile	.72
Ashamed	.71
Irritable	.69
Bothered	.67
Guilty	.65
Nervous	.64

Table 5. *Exploratory Factor Analysis – High-inconsistency Condition.* Factor loadings based on a principal-axis analysis using varimax rotation for 13 negative affect items used as the mood measure. High-inconsistency condition only. Dissonance items loaded onto a single factor with 8 other negative affect items. Loadings <.6 excluded.

Chapter 4

4 Discussion

The purpose of this study was to address some of the recent criticisms against cognitive dissonance and strengthen the theory using repeated measures of dissonance-related affect in response to varying levels of belief/behaviour inconsistency. Additionally, I aimed to extend the research on this topic, exploring individual differences in the experience of cognitive dissonance based on relationships with personality, religiosity, and political orientation.

This study used a procedure resembling the classic induced compliance paradigm popular with dissonance researchers (e.g., Cooper et. al, 1978; Elliot & Devine, 1994; Harmon Jones et. al, 2008). In this paradigm, participants typically write a counter-attitudinal essay under one of two conditions—one designed to provoke the dissonance-related affect and one thought to trigger no dissonance. However, the current study varied the magnitude of the inconsistency to examine changes in dissonance experience across inconsistency conditions using a within-participants design.

4.1 Dissonance Experience

Previous studies have supported the idea that participants experience more cognitive dissonance is in high-dissonance-inducing conditions (Cooper, 2019). However, although the data in this study did support Festinger's original premise that cognitive dissonance decreases as belief-behaviour inconsistency decreases, it did not show evidence that in the dissonance evoking condition, participants experienced an increase in dissonance experience relative to baseline. In fact, results appeared to show a decrease from baseline in dissonance experience in a low-inconsistency condition, rather than the anticipated increase from baseline in the high-inconsistency condition.

A common design in the dissonance literature involves a classic between-groups configuration, where one group is subjected to a dissonance-inducing task, another is subjected to a task not expected to trigger dissonance (Festinger & Carlsmith, 1959;

Stone et. al, 1994; Harmon-Jones, 2000). The effect is then confirmed by reporting greater dissonance in the former group than the latter. While this does demonstrate differences between the conditions, what it fails to show is how individuals respond to varying levels of the dissonance trigger, and how those groups experience dissonance in comparison to a baseline measure. This is an important assumption in the literature that, to my knowledge, has not been well tested.

The current study offered a direct test of this assumption by manipulating the magnitude of the dissonance experience within participants. Findings showed that dissonance experience did indeed scale with the magnitude of the inconsistency. However, this study also included a baseline condition, allowing for a test of the idea that the high-inconsistency condition provokes dissonance. Here, results failed to confirm this key assumption that is prevalent in the literature (Vaidis & Bran, 2019).

It should be noted that Elliot and Devine (1994) provided a baseline measure for comparison of dissonance across conditions. However, this baseline was measured in a separate group of participants who served as the "baseline" group. Given that these participants were never asked to undergo an actual dissonance-evoking manipulation, conclusions based on this procedure are limited. Moreover, the paper makes little mention of any double-blinding procedures or standardization of task instructions that would allow for a clean comparison between the baseline and manipulation groups.

In the present finding, the core premise of dissonance theory has been undermined. If the simple presence of a belief/behaviour inconsistency does not invoke dissonance immediately (as was previously assumed), then there is no clear process for how dissonance is triggered. Furthermore, the decrease of dissonance below baseline levels indicates a lack of knowledge about how it emerges in response to varying levels of inconsistency, as previously inconsistency conditions have rarely been predictor variables of interest (Vaidis & Bran, 2019).

Taken together, these results show that although participants experience changes in dissonance the predicted direction across the inconsistency conditions, there is no evidence that the condition theorized to cause dissonance does so. This begs the question

of what causes the belief change in such conditions. If participants do not experience increased dissonance in the dissonance-evoking condition, what would motivate dissonance reduction? Importantly, in the present study, participants completed the conditions in fully randomized order, meaning that simple order effects cannot be a factor in these results.

While the results supported the prediction that dissonance differs across inconsistency conditions, contrary to previous assumptions, I found no increase from baseline of dissonance affect in the high inconsistency condition—a puzzling result given the confidence with which this prediction has been stated as a basic premise of how dissonance works.

4.2 Belief Change

According to the theory of cognitive dissonance, the experience of dissonance leads to a process whereby participants are motivated to resolve experienced dissonance by changing their beliefs (Festinger, 1957). Belief change is therefore a widely used dependent measure in the literature. The present findings suggested that, contrary to predictions, belief change was negatively correlated with dissonance in the high-dissonance condition. That is, participants with greater dissonance experience showed less belief change in this condition. The results also showed that the low-inconsistency condition produced the greatest amount of belief change. This finding is in direct contrast to both dissonance theory (Festinger, 1957) and prior results (Breithaupt et. al, 2020).

Although belief (or attitude) change remains a widely used dependent measure of cognitive dissonance, it does not explicitly quantify dissonance itself. This is a shortcoming in the literature. The presence of belief change may imply a dissonance reduction process, but equally it may relate to other underlying phenomena. Indeed, to assume that belief change is caused by a dissonance reduction without a direct test is consistent with a logical fallacy known as “affirming the consequent” (James et. al, 1986). Still, belief change is often the indicator by which the occurrence, and resolution of, dissonance is implied. Even in developing the dissonance thermometer, Elliot and Devine (1994) relied on attitude change as the primary outcome variable with which to

verify their affect measure. Such outcome measures have been reasonably criticized as insufficient (Devine et. al, 1999; Vaidis & Bran, 2019), and to truly understand what lies at the heart of the dissonance process, its experience needs to be more effectively operationalized.

Measuring attitude change alone exposes conclusions drawn to questions concerning variables that, unconsidered, limit the degree to which attitude change can be attributed to dissonance alone. However, to conduct this study without also examining belief change would be to omit a critical comparison. As belief change has thus far been a key metric for measuring dissonance, I included it in this study to compare results with previous studies. If belief change was a sound measure of dissonance, it should occur regardless of, and even complement any additional measure. Belief change could then simply serve as a supportive rather than the primary dissonance measure.

Analysis of belief change across conditions showed that belief change alone is unreliable as a sole dissonance outcome variable. Contradicting previous findings (Festinger & Carlsmith,1959), belief change did not occur as expected across conditions. Festinger's original theory (1957) would predict both i) increased belief change as inconsistency (and, therefore, dissonance) increases and ii) a positive association between dissonance experience and belief change in a high-inconsistency condition. Instead, results revealed a higher belief change in the low-inconsistency condition compared with the high-inconsistency consistency condition. Additionally, belief-change negatively correlated with dissonance in the high-inconsistency condition. This result is consistent with some previous literature (see Elliot and Devine 1994), but is one that nonetheless raises questions concerning the process by which dissonance reduction occurs—does it occur during the task, immediately following, or only after reporting affect? Possible answers to this question should be explored in future work.

Concerning the measurement of dissonance-related affect, the dissonance thermometer is one of the few available self-report measures that approximates the subjective dissonance experience, subsequently allowing for measurement of how this experience responds to varying conditions. Results from a factor analysis revealed clear differentiation of

negative and positive affect. However, items from the dissonance thermometer's discomfort index (uncomfortable, uneasy, bothered) did not emerge as a unique negative factor, even in the high inconsistency condition, as they did in Elliot and Devine's study. Instead, in the present dataset, results suggested only a single "negative" factor that included a variety of negative affect items including those in the dissonance thermometer, as well as affect items such as "guilty", "ashamed" and "distressed". These results suggest that perhaps the dissonance state is characterized by general negative affect, rather than the highly specific items identified by Elliot and Devine. Thus, a re-characterization of the dissonance state may be warranted.

4.3 Individual Differences and Dissonance Experience

As predicted, the present results showed support for a negative association between political conservatism and cognitive dissonance, however there was no evidence for relationships between dissonance and either religiosity or extraversion under high levels of inconsistency. The failure of religiosity to relate to dissonance, is particularly interesting as political conservatism and religiosity have been anecdotally related, though it should be noted that a highly religious person is not necessarily the same as a highly conservative religious person (however they may be assumed to overlap; Lee et. al, 2018).

Interestingly, some of the earliest dissonance research also included a case study on belief-disconfirmation that involved a highly religious sect (Festinger et. al, 1956). That study suggested that religiosity might reduce the experience of dissonance as it documented lower levels of belief change in the face of disconfirming evidence. Additionally, recent evidence supports the idea that salience of religious concepts can diminish dissonance-reduction in some paradigms (Forstmann & Sagioglou, 2020). However, given the present results, it may be that alternate processes, rather than dissonance experience are at play in past findings.

This work suggests that religiosity is not irrelevant to the dissonance equation, but exactly how it factors in remains to be seen. As robust as the dissonance literature is, only a few studies deeply explore the implications of individual differences such as these on

dissonance experience, focusing mainly on higher level group differences (e.g., collectivist vs individualistic cultures; Hoshina-Browne et. al, 2005). It is clear that more research is needed and even more careful conclusions should be drawn.

4.4 Limitations

The above findings present some interesting challenges to dissonance theory, however there are several limitations to be considered. The first is that while I manipulated belief-behaviour inconsistency over three levels of inconsistency (vs. no variance in magnitude), dissonance could have been affected by the specific task itself. In the current study, participants were asked to write a counter-attitudinal paragraph arguing in favour of something they reported strongly disbelieving. Having to form an argument in favour of a highly disbelieved idea may trigger dissonance to a lesser extent than having to argue persuasively against an idea in which belief is very strong. The addition of such a condition would significantly enhance the present methodology.

Second, only a single aspect of inconsistency was manipulated in this study: its magnitude. Specifically, magnitude that concerns belief. Aspects such as non-belief related magnitude (e.g., exposure to colour-reversed playing cards; Vaidis & Bran, 2021) or salience of an inconsistency (Brehm & Wicklund, 1970) may alter the experience of dissonance affect in a similar design and may show effects that might more closely mirror those previously reported.

Lastly, previous counter-attitudinal tasks often ask participants (in many cases undergraduate students) to argue persuasively about more personally relevant and perhaps emotionally polarizing topics, such as university tuition increases (Harmon-Jones et al., 2008), race relations (Leippe & Eisenstadt, 1994), or animal rights (Cancino-Montecinos et al., 2018). Anecdotal data from debriefing questions revealed that some topics rated were more uncomfortable and provoked more negative emotion in the writing process than others. This perhaps indicates that dissonance is only sensitive when the nature or content of the inconsistency is sufficiently inflammatory.

4.5 Future Directions

Dissonance research has found practical applications in health interventions (Freijy, T., & Kothe, E. J., 2013), encouragement of pro-social and values-consistent behaviour (Stone et. al, 1994), and cross-cultural bridgebuilding (Leippe & Eisenstadt, 1994). The findings within this study deepen the current knowledge of the nature of cognitive dissonance, allowing for a more well-rounded understanding of how to apply this theory to real-world problems.

Considering the limitations described above, future research should aim to continue to fine-tune the measurement of cognitive dissonance, using the self-report dissonance thermometer as a reference point combined with physiological and implicit measures. Subsequent work must also strive to investigate of various dimensions of belief-behaviour inconsistency beyond mere magnitude to establish a variety of dissonance induction procedures that may be standardized according to individual or population differences.

Finally, future studies using counter-attitudinal tasks should account for both the personal importance and provocativeness of the content, as indifference towards a topic may interfere with dissonance effects.

Chapter 5

5 Conclusions

Although cognitive dissonance theory has been well established in social psychology and numerous other fields of study, together, these findings clearly highlight the need for further work on the topic. The current results corroborate certain aspects of the original theory (e.g., higher dissonance after exposure to high inconsistency vs low or no inconsistency) and introduce an improved measurement process, but raise further questions about others (Does inconsistency alone trigger cognitive dissonance affect? What specific emotions characterize dissonance experience? Does the experience of dissonance necessarily trigger belief/behaviour change?). Ultimately, there are still significant gaps in how dissonance is understood, which must be investigated and well-established before it should be applied outside of the lab.

On the surface, cognitive dissonance is a neatly packaged and straightforward idea that serves as an explanation for unexpected changes in behaviour and attitudes. However, even with hundreds of thousands of publications on the topic, dissonance theory has not proven to be immune to the issues prevalent in psychology. While some of these studies (many of them early on in dissonance history) have challenged some of the claims and conclusions this theory boldly asserts, most of the subsequent work on dissonance uses the theory as a springboard for application in other domains rather than conducting a thorough re-examination of the theory itself.

Many initial assumptions of the theory have remained untested, and by revisiting the basics of cognitive dissonance, this study serves as a single building block in a foundation of solid psychological research.

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7 Appendices

7.1 Appendix A – Ethics Approval Certificate

Western Research

Date: 27 October 2021

To: Dr. Erin Heerey

[redacted]

Study Title: Persuasive messages and mood

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 05/Nov/2021

Date Approval Issued: 27/Oct/2021 21:30

REB Approval Expiry Date: 27/Oct/2022

Dear Dr. Erin Heerey

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. **All other required institutional approvals and mandated training must also be obtained prior to the conduct of the study.**

Documents Approved:

Document Name	Document Type	Document Date	Document Version
SONA_advert	Recruitment Materials	20/Oct/2021	1
CD_LOI	Written Consent/Assent	20/Oct/2021	1
Debrief	Debriefing Letter	20/Oct/2021	1
Questionnaires	Online Survey	20/Oct/2021	1

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Ms. Katelyn Harris , Research Ethics Officer on behalf of Dr. Randal Graham, NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Curriculum Vitae

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