"Thinking Hard or Hardly Thinking?"

Objective vs Subjective Elaboration and Resistance to Persuasion

by

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A thesis submitted to the Department of Psychology

In conformity with the requirements for the

degree of Master of Science

Queen's University

Kingston, Ontario, Canada

(January 2025)

Abstract

Attitudes that are formed through extensive elaboration tend to be more resistant to persuasion compared to attitudes based on less elaboration (Petty & Cacioppo, 1986). However, the measures researchers use to assess elaboration can vary; for example, a given researcher may use objective measures (e.g., those that capture the actual extent of message-relevant thinking, such as thought listings) or subjective measures (e.g., those that capture self-reported perceptions of elaboration, such as rating scales). Although both approaches are used, the distinction between objective and subjective measures of elaboration is not always explicit, which may be an issue given the unique roles these different types of measures may play within a given research context. The current research sought to examine if objective and subjective elaboration represent distinct constructs that independently or jointly contribute to resistance to persuasion. Study 1 manipulated objective and subjective elaboration separately to test the ability of subjective elaboration to promote persuasive resistance in the absence of objective elaboration; the results showed no clear differences in resistance outcomes based on variation in the different types of elaboration. Study 2, which was similar to Study 1, employed a 2x2 factorial design to fully cross the objective and subjective levels of elaboration to comprehensively examine their main and interactive effects on persuasive resistance. Although subjective elaboration showed marginal effects on the attitude and intention outcomes, they were in the opposite of the predicted direction and no other meaningful effects emerged. Together, these studies do not provide clear evidence for the unique roles that objective and subjective elaboration likely play in resistance to persuasion. Several limitations are noted, such as potentially weak manipulations, as well as possible interventions to improve future studies in this line of research.

Co-Authorship

Isaac Lindenberger takes full authorship for the present set of studies in their current form. In the future, authorship will be shared with Dr. Leandre Fabrigar, Dr. Richard Petty, and Darcy Acevedo-Torres as this research line continues and is prepared for publication in other professional and academic environments.

Acknowledgements

First and foremost, I would like to thank my supervisor, Dr. Leandre Fabrigar, for his continuous support during the writing of this thesis, as well as for the many headaches he endured throughout. I would also like to thank my committee, Dr. Jill Jacobson and Dr. Li-Jun Ji, for their insightful feedback and thoughtful suggestions, which were instrumental in shaping the final document. Finally, I want to extend my heartfelt gratitude to my family, friends, and colleagues, who each know they may now bring up my thesis without consequence.

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Chapter 1 Introduction

In an effort to understand how people think and make choices, social psychology has long focused on the impact of attitudes in guiding human behavior. Although definitions have evolved across time, social psychology typically defines an attitude as a favorable, unfavorable, or neutral evaluation of an attitude object, which can be anything from one's own self, another person, an external item, or an abstract concept (Kruglanski & Stroebe, 2012). The study of attitudes has a rich history, with some of the first quantitative work on the subject focusing on the idea that attitudes can be empirically measured (Thurstone, 1928). Thurstone, who was the first person to propose a formal method for their measurement, characterized the attitudes people hold by a single numerical value that reflects where they have mapped the target of their attitude onto an underlying evaluative continuum. However, this early research also noted that attitudes are complex and multidimensional constructs that cannot be fully captured by a single numerical index. Because measuring the attitude itself provides only part of the picture of what an attitude truly is, other psychological properties of attitudes that are not captured by Thurstone's and subsequent attitude measurement procedures are also important to consider.

Attitude Strength

One example of such an additional attitude property is attitude strength, which refers to the degree to which attitudes are both durable and impactful, reflecting their persistence over time, resistance to change, and influence on thought and behavior (Petty et al., 1995). In other words, strong attitudes are attitudes that are firmly held and exert a powerful influence over an individual's perceptions, judgments, and behaviors. This concept illustrates how two people could rate an item, such as a necklace, at a 6 out of 10 on an attitude scale, but the extent to which they hold to that 6 could vary considerably, demonstrating an aspect of attitudes that goes beyond the single numerical rating to encompass the degree to which the attitude is enduring and consequential. In an effort to more fully explore what makes some attitudes stronger than others, researchers have noted a number of properties of attitudes that determine their underlying strength, including attitude accessibility, ambivalence, knowledge, and elaboration (Krosnick et al., 1993).

For example, attitude accessibility refers to the speed and relative ease by which an attitude comes to mind (Fazio, 1995). Attitudes that are more frequently activated or associated with stronger emotions tend to be more accessible. Ambivalence refers to the extent to which an individual simultaneously holds both positive and negative reactions towards the same attitude object or issue (Krosnick & Petty, 1995). Higher levels of ambivalence are associated with weaker attitudes. Additionally, the degree of knowledge or information upon which an attitude is based also plays a role in determining attitude strength. Attitudes that are founded on a large body of relevant knowledge tend to be stronger compared to attitudes based on limited information (Wood et al., 1995). Finally, elaboration relates to the extent a person has thought deeply about an attitude object, with more elaboration tending to relate to attitudes that are stronger (Petty & Cacioppo, 1986; Petty et al., 1995).

Measures of Attitude Strength Determinants

When measuring the determinants of attitude strength, researchers employ one of two main approaches: subjective measures or objective measures. Subjective measures of attitude strength determinants are self-reported assessments that require individuals to have introspective awareness of the attitudinal property that the measure is intended to assess. These measures presume that people can directly access and accurately report on their own attitudinal properties despite potential cognitive biases and limitations in self-awareness (cf., Nisbett & Wilson, 1977).

For example, a subjective measure of attitude accessibility would involve asking participants to rate how quickly their attitude comes to mind, which presumes that they can introspectively access the ease or difficulty of attitude retrieval and also meaningfully gauge whether this speed of retrieval should be considered fast or slow. In short, these subjective measures involve metacognitions (i.e., higher order cognitions about one's mental representations; e.g., see Petty et al., 2007 for an example of a discussion about metacognitions).

On the other hand, objective measures of attitude strength determinants involve having individuals perform judgmental tasks related to the attitude and then measuring an objective property of how those tasks are carried out. This objective property is presumed to be related to the strength determinant of interest. Importantly, although the judgmental tasks themselves may be subjective, the measure focuses on an objective property of how the tasks are performed (Bassili, 1996). For instance, an objective measure of attitude accessibility could involve asking participants to report their attitude and measuring the speed with which they respond (see Fazio et al., 1986 for the source of the measure). In this case, the self-reported attitude judgment is subjective, but the response latency is an objective property of how the judgment was made, theoretically reflecting the underlying associative strength between the representation of the attitude object and evaluation. Thus, objective measures may sometimes rely on subjective judgments, but they do not require the individual to make metacognitive assessments about the contents of their mental representations and/or relationships among these representations.

Although subjective and objective measures of attitude strength determinants have both been used for many years, the distinction between these different measurement types has not always been extensively discussed. For example, in a classic review of strength measures, Wegener et al. (1995) discuss various measures of attitude strength without making any particular theoretical or methodological points about the strengths or limitations of subjective versus objective measures as general categories. That being said, although the distinction has not always been prominently featured, certain differing perspectives about it have arisen within the research community.

Perspectives Towards Objective and Subjective Measures

Although researchers have employed both objective and subjective measures to assess the strength of attitudes, distinct viewpoints have arisen regarding the relationship between these two types of measures and their relative utility in predicting various outcomes. Three primary perspectives have emerged, the first of which holds that objective and subjective measures of attitude strength are essentially interchangeable. Researchers who adopt this view presume both types of measures capture the same underlying construct and that both are able to arrive at adequate representations of this construct. For example, they might consider asking people how knowledgeable they are about an issue (a subjective measure) as equivalent to asking them to list their knowledge on the topic and counting the items listed (an objective measure). Although this perspective has never been explicitly articulated, it is implicit in the way that many researchers have treated these measures. Evidence for this perspective can be found in studies where researchers use subjective measures in one study and objective measures in another without commenting on any possible implications of the change in measurement (e.g., Davidson et al. 1985). Additionally, some researchers average or sum objective and subjective measures, implying that they are alternate measures of the same construct (e.g., in the case of ambivalence, see Conner & Armitage, 2008).

The second perspective holds that objective and subjective measures of attitude strength are not interchangeable. This perspective consists of two positions, both of which maintain that objective and subjective measures are not equivalent and that one measure is better than the other. This is either because objective and subjective measures are thought to capture the same construct and one does a much better job, or alternatively because they capture different constructs and one of them is not useful. The first and most common of these perspectives favors objective measures, whereas the second contends that subjective measures may be more appropriate in certain contexts. The viewpoint that objective measures are superior has been most explicitly articulated by Bassili (1996), who argued that objective measures (which he terms "operative measures") are better indicators of attitude strength than subjective measures (which he refers to as "meta-attitudinal measures"). Bassili proposed that objective measures better capture the underlying structural features of attitudes that contribute to their strength. Additionally, Bassili maintained that objective measures are less vulnerable to limitations in one's introspective abilities, as people may lack insight into the factors that contribute to their attitude's strength. In support of his overall distinction, Bassili demonstrated that objective and subjective measures often loaded on separate factors, even when they were ostensibly designed to measure the same attribute (although this was not ubiquitously the case). Furthermore, he presented evidence that suggested objective measures tended to be better predictors of outcomes related to both attitude stability and resistance to persuasion.

Taking the alternative and less common view, some researchers who also believe these measures are not interchangeable have appeared to suggest that subjective measures should be regarded as more meaningful in certain contexts, though they do not state this explicitly. This perspective seems to be most prevalent in the attitudinal ambivalence literature, where researchers have implied that subjective measures of ambivalence are more central or relevant than objective measures. First, researchers have clearly acknowledged that the two measures cannot be treated as interchangeable because they specifically document cases of when they diverge (e.g., Newby-Clark et al., 2002). Second, this notion is reflected in the use of terminology, which carries certain implications. For example, both Thompson and Zanna (1995) and Newby-Clark et al. (2002) labeled subjective measures of ambivalence as "felt ambivalence" and the objective measures as "potential ambivalence." This terminology implies that at some level the objective measure is not the construct of interest but rather a precursor to it. Finally, a third implied way in which the subjective measure might be seen as superior is how researchers validated their objective measures, which is based on the extent to which they corresponded to the subjective measure, as seen in both Priester and Petty (1996) and Thompson and Zanna (1995).

A third contrasting viewpoint, known as the dual construct perspective, maintains that both objective and subjective measures of attitude strength determinants are valuable and posits three main premises. First, it proposes that objective and subjective measures are not interchangeable. Second, this perspective uniquely maintains that both types of measurement can provide valuable and distinct insights into the factors that influence attitudes. Third, this view argues that subjective measures tend to capture more deliberative and intentional processes, whereas objective measures tend to reflect more spontaneous and non-intentional processes. To test these premises, See et al. (2008, 2013) focused specifically on the context of affective-cognitive bases of attitudes - the extent to which people's global evaluations are predominantly based on affect versus cognition. Consistent with the dual construct perspective's first premise that the measures are not interchangeable, they found that objective and subjective measures of affective-cognitive bases had very weak correlations, averaging around 0.06, indicating that they are almost entirely independent of one another.

In line with the dual construct perspective's second premise that both measurement types are unique and valuable, See et al. (2008, 2013) provided several examples where each type of measure independently predicted key outcomes. For instance, both types of measures were shown to independently predict susceptibility to different types of persuasion, with these effects operating independently of one another (See et al., 2008). Additionally, objective and subjective measures independently predicted reliance on various types of information when making judgments of preference, such as ranking books or movies (See et al., 2008). Likewise, both measures were found to predict the amount of time spent processing different types of information (See et al., 2013). Interestingly, these time spent processing effects were reversed for the two measures, further exemplifying how independent they are as they predict entirely opposite outcomes.

Supporting this third premise that subjective measures capture deliberative and objective measures capture spontaneous processes, See et al. (2013) found that under conditions of high thought, subjective measures tended to be better predictors of outcomes. Specifically, when participants carefully deliberated on their responses, their subjective perceptions of the affective-cognitive nature of their attitudes (meta-bases) were more predictive of their interest in affective versus cognitive information. Alternatively, objective measures were more predictive under less thoughtful conditions. When participants responded more spontaneously without much deliberation, the actual affective-cognitive composition of their attitudes (structural bases) was a better predictor of their information interest. These findings highlight the importance of considering both subjective and objective measures in various contexts, as they may capture different processes and be differentially predictive depending on the circumstances.

Ultimately, the dual construct perspective contends that considering both objective and subjective measures, rather than assuming one is inherently better, will provide the most comprehensive assessment of the factors influencing attitude strength. Furthermore, See et al. (2013) suggested that this dual construct framework could potentially apply to aspects of attitude strength beyond attitude bases. However, it is still unclear whether the unique roles of objective and subjective measures are specific to this domain or if the dual construct perspective has broader applications. To determine the generalizability of this perspective for objective and subjective attitude strength measures, systematic explorations within other attitudinal properties are required.

A reasonable starting point for this exploration is elaboration. First, there are well-established objective and subjective measures of elaboration, both of which have been used in the literature. Second, elaboration is one of the dimensions of attitude strength that has generated significant attention and research interest (see Petty et al., 1995; Barden & Tormala, 2014 for reviews). Therefore, in this thesis, I aim to fill the existing research gap by investigating whether objective and subjective measures of elaboration fit within a dual process framework when predicting key attitude strength outcomes.

Objective vs. Subjective Elaboration

Elaboration is a central concept in the study of attitude strength; this term is defined in the attitudes literature as the process of carefully scrutinizing the merits of information in terms of its evaluative implications for forming or changing an attitude towards an existing target. Attitudes formed or changed on the basis of extensive elaboration tend to be stronger than ones based on less extensive elaboration (e.g., Petty & Cacioppo, 1986; Haugtvedt & Petty, 1992). Importantly, elaboration involves more than simply learning information - it also entails evaluating the information's true value, plausibility, and cogency in light of one's existing knowledge and logical inferences (Petty et al., 1995). Indeed, elaboration models of persuasion suggest that the reactions people have to a message determine their attitudes, as people may even forget the arguments that triggered these reactions but still form lasting attitudes based on the thoughtful elaboration those arguments stimulated (Petty & Cacioppo, 1986).

Common measures of elaboration include subjective self-report measures that ask people to judge how effortfully or extensively they thought about information related to the attitude object. In contrast, the most common objective measure of elaboration is the thought-listing task, where participants list all thoughts that came to mind while being presented with attitude-relevant information. Such thought listings can be analyzed in multiple ways; for example, the participant may judge which thoughts are relevant to the focal topic, or independent coders may make that assessment. Regardless, researchers can then compute either the proportion of total thoughts that were relevant or the total raw amount of relevant thoughts as an objective index of elaboration.

Although early literature did not make a strong distinction between objective and subjective measures of elaboration, Barden and Petty (2008) explicitly suggested these two types of measures may each capture rather distinct constructs. Consistent with these constructs being the unique, they found only modest correlations between objective and subjective elaboration measures (e.g., .30 to .57). Furthermore, in studies manipulating only subjective elaboration while holding objective elaboration constant, subjective elaboration predicted behavioral intentions to support new university policies above and beyond objective elaboration, supporting the notion that subjective elaboration captures something distinct from what is assessed by objective measures. However, Barden and Petty's studies did not fully investigate the distinction between objective and subjective elaboration. For example, other types of attitude strength outcomes were not examined in their research.

The goal of this thesis is to provide a more systematic exploration of the premise that subjective and objective elaboration are independent constructs that each uniquely contribute to attitude strength outcomes; particularly (in the present work), resistance to persuasion. In the current studies, I aim to investigate how both subjective and objective elaboration play important but potentially different roles in conferring resistance. I hypothesized that objective elaboration may impact resistance to persuasion by affecting one's *ability* to effectively counterargue a persuasive message. Because objective elaboration can build on prior knowledge and personal experience to help develop extensive, organized, and accessible cognitive networks, this process might help a person to generate compelling counterarguments when an attitude is threatened (Petty et al., 1995). However, the ability to counterargue is not the only important process in resistance. To counterargue effectively, one must also have the *motivation* to resist, which may relate more directly to subjective elaboration. Therefore, I hypothesized that subjective elaboration likely brings metacognitive confidence that one's attitude is well-justified and valid, motivating defense of the attitude in question. Although unlikely to enhance one's ability to counterargue, this increased motivation from subjective elaboration can potentially help someone resist influence attempts, whereas low subjective elaboration may increase reluctance to counterargue as one may question why one should try defending a position that one has not deeply considered.

Ultimately, by examining the independent effects of both the subjective perception of elaboration and actual objective amount of elaboration, this thesis should help to establish that these constructs and their respective measures should be seen as distinct. It should also provide additional evidence to evaluate the dual construct perspective proposed by See et al. (2008, 2013) as a general framework for understanding measures of attitude strength determinants. To investigate the different types of elaboration and their measures, I manipulated objective elaboration and subjective elaboration separately in Study 1. This three-cell design allowed me to investigate if subjective elaboration is sufficient to enhance resistance when objective elaboration is low. Building upon the first study, I fully crossed objective and subjective elaboration in a 2x2 design in Study 2, a comprehensive approach intended to fully clarify the distinct roles of objective and subjective elaboration. Together, these studies aimed to shed light on the interplay between objective and subjective elaboration as distinct processes and determine the relative utility of each type of measurement approach for understanding attitude strength and outcomes like resistance to persuasion.

Chapter 2

Study 1

In the first study, I investigated the relationship between objective elaboration and subjective elaboration in the context of resistance to persuasion. I began by conducting an initial pretest to select an appropriate topic for the main study. An ideal topic was one that people had relatively positive initial attitudes towards so that a pro-attitudinal message could make these attitudes even more positive, which would ensure participants began the main study with largely similar attitudes across conditions. Having initial attitudes be similar allows for meaningful comparisons when attempting to later change attitudes in the opposite direction—Cannabis legalization in Canada was chosen as the focal topic in this study based on these criteria (M=4.91, SD=1.70) using a 7-point scale (for more information on the pretest, see Appendix E).

This first study was primarily designed to investigate whether high levels of subjective elaboration would confer greater resistance to persuasion compared to low levels by increasing *motivation* to resist, despite holding objective elaboration (and thus *ability* to resist) constant. The first condition was a manipulation that was intended to increase objective elaboration without affecting subjective elaboration (high objective, ambiguous subjective). The second condition aimed to decrease objective elaboration but sought to increase subjective elaboration (low objective, high subjective). Finally, the third condition was intended to decrease both objective and subjective elaboration (low objective, low subjective). Although the impact of objective elaboration on resistance can also be investigated for exploratory reasons, the design of this study is not optimally configured for this purpose.

Method

Participants

Participants consisted of 184 Queen's students who completed the study for course credit. Data collection continued until the end of the academic year to maximize sample size, with a predetermined minimum threshold of 150 participants that was comparable to previous research (Barden & Petty, 2008). Four participants were excluded from the final analysis based on a priori defined criteria for minimum study progress. Specifically, participants were excluded if they had a 'Progress' indicator less than 50, suggesting they completed less than half of the study materials. Exclusion criteria were established to ensure data quality and participant engagement. After applying these criteria, data from 180 participants were retained for the final analysis. Among these participants, the demographic profile was similar to other studies at Queen’s: 41 participants were men, 139 were women, 142 identified as White/Caucasian/European, 14 as East Asian (e.g., Chinese, Korean, Japanese, etc.), 7 as Black/African, 1 as South Asian (e.g., Indian, Pakistani, etc.), and 16 as not specified/other.

Procedure

Upon arriving at the lab, participants were seated at individual computer stations separated by partitions to minimize distractions. All study materials were presented on the computer using the Qualtrics survey platform (for all ethics related materials for Study 1, see Appendix A. For all materials and measures for Study 1, see Appendix B). Participants were randomly assigned to one of three experimental conditions: high objective-ambiguous subjective elaboration, low objective-high subjective elaboration, or low objective-low subjective elaboration. Please note that each of the sections that follow were presented to participants in the same fixed sequence as discussed.

Phase 1: Inducing Targeted Attitudinal Properties

The first goal of phase 1 was to ensure that attitudes towards legal cannabis were generally positive across conditions to allow room for persuasion to occur. However, although these attitudes should be comparable across conditions, the second goal of phase 1 was to create underlying differences in the objective and subjective elaboration underlying these comparable attitudes.

Manipulation of Objective Elaboration. At the start of the study, participants in the two low objective elaboration conditions completed a distraction task involving abstract artwork. They were informed that the study was investigating responses to artwork in two conditions: one showing the artwork and immediately asking for thoughts, and another showing the artwork and asking for thoughts after completing unrelated tasks. The stated purpose was to see if the delay affected their insights about the artwork. In reality, this description was a cover story to disguise the true function of the task as a distraction from the subsequent persuasive message. Participants in these two conditions were shown a complex, abstract image with multiple components. The image was carefully selected to provide ample material for distraction and limit the cognitive resources available for processing the upcoming persuasive message (Petty & Brock, 1981). Participants were instructed to hold the image in their mind while completing the study and contemplate its meaning, increasing the efficacy of the manipulation. In contrast, participants in the high objective elaboration condition were not shown any artwork and proceeded directly to the next part of the study. This approach allowed for a clear differentiation between high and low levels of objective elaboration.

Pro-attitudinal Message. Following the distraction task (or lack thereof), all participants read a persuasive message in favor of cannabis legalization in Canada that contained strong arguments supporting legalization (arguments were individually assessed to ensure they were seen as supportive and convincing during the previously mentioned pretest). The arguments emphasized benefits such as increased tax revenue, reduced criminal justice costs, weakening of organized crime, allowing police to focus on more serious crimes, and bringing the cannabis market under regulatory control for enhanced public health and safety. Given most participants had positive initial attitudes towards legal Cannabis, the goal of the message was to further ensure participants held comparably positive attitudes across conditions as well as to create the opportunity for differences to emerge in the extent of objective and subjective elaboration.

Quiz on the Pro-attitudinal Message. After reading the message, participants completed a 10-item multiple choice quiz assessing their recall of the key arguments. The first purpose of the quiz was to use participant performance as a basis for false feedback to manipulate subjective elaboration. Thus, the quiz items varied in difficulty to lend credibility to the false feedback. The second goal of the quiz was to score it as a manipulation check of objective elaboration, as participants in the low objective elaboration conditions (who were distracted by the artwork) should theoretically perform worse on the quiz compared to participants in the high objective elaboration condition who were not distracted. This assumption is based on the premise that distracted participants had fewer cognitive resources available to process and retain the information presented in the persuasive message (Petty et al., 1976).

Manipulation of Subjective Elaboration. After submitting their quiz responses, participants received false feedback about their performance as part of the subjective elaboration manipulation. Participants in the high subjective elaboration condition were told they answered two more questions correctly than the average student, suggesting they had thought deeply about the persuasive message. In contrast, participants in the low subjective elaboration condition were told they answered two fewer questions correctly than average, implying they had not given much thought to the arguments. Participants in the ambiguous subjective elaboration condition (which was also the high objective elaboration condition) did not receive any feedback. This manipulation was adapted from Barden and Petty (2008) and aimed to influence participants' perceptions of their own elaboration, holding the actual extent of elaboration constant.

Phase 1 Measures. Following the quiz for the high objective elaboration participants/the manipulation of subjective elaboration for the low objective participants, all participants completed measures of their Time 1 attitudes, attitude certainty, and behavioral intentions. They next completed a manipulation check of subjective elaboration (perceived elaboration measure) as well as a manipulation check of objective elaboration (relevant cognitive responses).

Phase 2: Testing Resistance to Persuasion

Having set-up comparably positive attitudes and differences in objective and subjective elaboration across conditions during phase 1, the goal of phase 2 was to present participants with a counter-attitudinal message to see if resistance to persuasion differed across the conditions.

Counter-Attitudinal Message. In the second phase of the study, all participants read a new persuasive message that presented strong arguments against cannabis legalization with the goal of differentially persuading participants on the basis of their levels of objective and subjective elaboration (as before, arguments were individually assessed to ensure they were seen as unsupportive and convincing during the pretest). This message focused on potential risks and downsides such as increased cannabis use among youth, more traffic accidents caused by impaired driving, greater risk of mental health issues, and administrative and enforcement challenges.

Phase 2 Measures. Following the counter-attitudinal message, all participants completed measures of their Time 2 attitudes, attitude certainty, and behavioral intentions.[1]

Picture Recall. Next, to align with the cover story and ensure participants were following instructions, participants in the two low objective elaboration conditions who were distracted by the artwork answered some questions about it, such as reporting the number of discrete objects they could remember from the image. Participants in the high objective elaboration condition did not complete this measure as they were not exposed to the distracting artwork.

Debriefing

After finishing the recall task, participants were thanked for their time and fully debriefed. The debriefing explained the true purpose of the study, the rationale behind the experimental manipulation of objective and subjective elaboration, and why deception was necessary to test the hypotheses. Participants were given the opportunity to ask any questions they had about the research before being dismissed.

Measures

Each of the measures that follow were presented to participants in the same fixed sequence as discussed.

Manipulation Check of Objective Elaboration: Quiz Score. Participant scores on the quiz served as a manipulation check on the objective elaboration manipulation. Correct responses were summed to compute a quiz performance score for each participant, which produces a score with a possible range from 0 (*worst possible performance*) to 10 (*best possible*

[1] Need for Cognition (Petty & Cacioppo, 1986) was included for exploratory purposes and will not be analyzed in the body of this thesis. However, it will be discussed to illustrate when participants completed this measure as part of the overall study flow. Interested readers can find the analyses for this measure in Appendix F.

performance; α = .52).[2]

Time 1 Attitudes. Attitudes towards cannabis legalization were assessed first using a randomized series of 8 unipolar items on 7-point scales, using anchors such as *Not at all* to *Definitely* (Crites et al., 1994). These items gauged whether participants viewed legalization as positive, negative, likeable, dislikeable, good, bad, desirable, and undesirable. The four negative items were reverse scored and responses were then averaged to form a composite attitude index (M = 5.158, SD = 1.438, skewness = -0.832, kurtosis = 0.168), which produces a score with a possible range from 1 (*least favorable attitudes*) to 7 (*most favorable attitudes*; α = .95). Time 1 attitudes were included to serve as the covariate for Time 2 attitudes and to determine if participants had attitudes that did not differ prior to the Time 2 attitude measure.

Time 1 Certainty. Attitude certainty was measured using three randomized items assessing how certain, confident, and sure participants were of their opinion on legalization, using anchors such as *Not at all* to *Absolutely*. Responses were provided on 7-point unipolar scales and averaged to form an overall certainty index (M = 5.243, SD = 1.303, skewness = -0.428, kurtosis = -0.386), which produces a score with a possible range from 1 (*least certain attitudes*) to 7 (*most certain attitudes*; α = .95). Please note that the analyses for Time 1 certainty are not included in the results section as they were included for exploratory purposes; however, they can be found at the end of this document (i.e., Appendix F).

Time 1 Intentions. Behavioral intentions were measured with three randomized items asking how likely participants would be to vote in favor of legalization, sign a petition supporting it, and add their name to a list expressing their support publicly, using anchors such as

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[2] Of note, this falls below the traditional threshold of what would normally be considered good reliability (e.g., >.70; Nunnally, 1978).

Very Against to *Very in Favor*. Responses were given on 7-point bipolar scales and averaged to create a behavioral intention index (*M* = 4.309, *SD* = 1.668, skewness = -0.058, kurtosis = -0.959), which produces a score with a possible range from 1 (*least likely intentions*) to 7 (*most likely intentions*; α = .81). Time 1 intentions were included to serve as the covariate for Time 2 intentions and to determine if participants had intentions that did not differ prior to the Time 2 intention measure.

Manipulation Check of Subjective Elaboration: Perceived Elaboration. The measure of perceived elaboration consisted of four items adapted from Barden and Petty (2008) that asked participants to rate how much attention they paid to the persuasive message, how much thought they gave to it, how much effort they spent reading the arguments, and how knowledgeable they felt about the topic as a result, using a scale from *None* to *A lot*. Responses were provided on 5-point scales and averaged to compute a perceived elaboration score (*M* = 2.417, *SD* = 0.762, skewness = -0.067, kurtosis = -0.746), which produces a score with a possible range from 0 (*least subjective elaboration*) to 4 (*most subjective elaboration*; α = .75).

Manipulation Check of Objective Elaboration: Relevant Cognitive Responses. Participants were to list any thoughts that came to mind while reading the persuasive message, up to a maximum of ten thoughts, and that listing no thoughts would be considered acceptable. Participants were informed that these thoughts could be positive, neutral, negative, or unrelated, and that the researchers were simply interested in knowing these thoughts (*M* = 4.654, *SD* = 2.371, skewness = 0.518, kurtosis = 0.305). This thought-listing task was included as an objective measure of elaboration, capturing the extent of message-relevant thinking. Responses were fully coded by the author and partially coded by a separate independent coder, both of whom were each blind to condition, and summed to create a count of relevant thoughts for each participant, which produces a score with a possible range from 0 (*lowest number of relevant responses)* to 10 (*highest number of relevant responses*). The interrater reliability of the 30 response sets assessed by both coders was r=.799.

Time 2 Attitudes. The Time 2 attitude measure consisted of the same eight items used at Time 1, but this time on four randomized bipolar semantic differentials on a 7-point scale rather than eight unipolar items on the same scale (e.g., *bad-good* vs *not at all-bad* and *not at all-good*) to reduce response consistency pressure. Responses were recoded and averaged to yield a Time 2 attitude score (M = 3.992, SD = 1.340, skewness = -0.097, kurtosis = 0.073), which produces a score with a possible range from 1 (*least favorable attitudes*) to 7 (*most favorable attitudes*; α = .91).

Time 2 Certainty. The Time 2 certainty measure was identical to the Time 1 measure, except it employed 9-point rather than 7-point unipolar scales to reduce response consistency pressure. Responses were averaged to form a Time 2 certainty index (M = 6.067, SD = 1.859, skewness = -0.096, kurtosis = -0.667) which produces a score with a possible range from 1 (*least certain attitudes*) to 9 (*most certain attitudes*; α = .97). The analyses for Time 2 certainty are not included in the results section as they were included for exploratory purposes; however, they can be found at the end of this document (i.e., Appendix F).

Time 2 Intentions. The Time 2 intention measure was identical to the Time 1 measure, except it used 9-point rather than 7-point bipolar scales to reduce response consistency pressure. Responses were averaged to yield a Time 2 intention index (M = 4.745, SD = 2.222, skewness = 0.155, kurtosis = -0.879), which produces a score with a possible range from 1 (*least likely intentions*) to 9 (*most likely intentions*; α = .88).

Picture Recall. This measure was included to assess compliance with the distraction manipulation, aligning with the use of instructional manipulation checks to validate participant engagement (Oppenheimer et al., 2009). The average number of objects recalled was around 5-6, which indicates that participants were engaging with the distraction task (M = 5.690, SD = 2.518, skewness = 0.090, kurtosis = -0.525). If participants had been unable to list any objects or could only list one or two, it would have raised concerns that they were not actually carrying out the task as instructed.

Results

Manipulation Checks

The first set of analyses is intended to verify the success of the experimental manipulations.

Subjective Elaboration Check: Perceived Elaboration. An initial analysis was conducted to determine if the manipulation of perceived elaboration was successful. A one-way ANOVA with condition as the independent variable and perceived elaboration as the dependent variable revealed at least one significant difference between conditions in terms of perceived elaboration, $F(2, 177)=6.57$, $p=.002$, $\eta^2=.069$. Thus, the manipulations had some impact on perceived elaboration. To further clarify this effect, the associated means and standard deviations by condition for perceived elaboration can be found in the first row of Table 1. Note that perceived elaboration is above the midpoint for each condition, indicating that participants tended to feel they had at least moderately elaborated across conditions (e.g., the midpoint of 2 is *A moderate amount*).

For this measure, the most directly relevant comparison is between the low objective-high subjective condition and the low objective-low subjective condition. A follow-up planned contrast demonstrated that participants in the low objective-high subjective condition believed that they had elaborated more deeply than participants in the low objective-low subjective condition, $t(177)=2.94$, $p=.010$, $SE=0.136$, $d=0.519$, indicating that the manipulation of subjective elaboration was successful.

Also of interest is the extent to which participants objectively high in elaboration subjectively perceived their elaboration to be, given that subjective elaboration was not manipulated in this condition and therefore was left somewhat ambiguous. To investigate their levels of subjective elaboration, the high objective condition was compared to the low objective-high subjective condition in a planned contrast. Interestingly, these groups did not differ significantly in their perceived elaboration, $t(177)=0.44$, $p=.900$, $SE=0.133$, $d=0.075$. Thus, although elaboration was left ambiguous in the high objective condition, participants in this group subjectively perceived their elaboration to be as high as those who were explicitly told they had elaborated extensively. This finding is important because it suggests that, at a practical level, the high objective condition effectively functions as a high-high condition (high in both objective and subjective elaboration).

Table 1: Descriptive statistics for each manipulation check, consisting of means (M) and standard deviations (SD) for each of the three conditions (Study 1)

	Condition 1 High Objective		Condition 2 Low Obj, High Sub		Condition 3 Low Obj, Low Sub	
	M	*SD*	*M*	*SD*	*M*	*SD*
MC1: Perceived Elaboration (0-4 scale)	2.578	0.675	2.520	0.853	2.120	0.662
MC2: Objective Elab: Quiz Performance	6.689	1.689	6.127	1.571	5.589	1.952
MC3: Objective Elab: Cognitive Responses	4.733	2.201	4.888	2.771	4.309	2.054

Objective Elaboration Check 1: Quiz Performance. A subsequent analysis was conducted as a manipulation check of the distraction intervention's effect on elaboration by determining if people in the objective elaboration condition performed better on a quiz than did people in the subjective elaboration conditions who were distracted. A one-way ANOVA with condition as the independent variable and quiz score as the dependent variable revealed at least one significant difference between conditions in terms of quiz performance, $F(2, 177)=5.86$, $p=.003$, $\eta^2=.062$. Thus, the manipulation had some impact on quiz performance. To further clarify this effect, the associated means and standard deviations by condition for quiz performance can be found in the second row of Table 1. Note that participants answered more than half of the questions correct on average, indicating they were likely able to at least somewhat objectively elaborate across conditions.

Importantly, the two low objective conditions underwent the subjective manipulation after taking the quiz, so these two groups should not differ from one another. Indeed, a planned contrast conducted between the low objective-high subjective condition and the low objective-low subjective condition showed no significant differences, $t(177)=1.69$, $p=.093$, $SE=0.319$, $d=0.310$.[3] Thus, the level of subjective elaboration did not significantly impact quiz performance when objective elaboration was low. Given the non-significant difference between these conditions, they were pooled for further investigation. When grouping the low objective elaboration conditions together ($M=5.874$, $SD=1.773$), a planned contrast showed a significant effect of the grouped condition variable, $t(177)=3.04$, $p=.003$, $SE=0.547$, $d=0.478$, which provides evidence for the effect of objective elaboration on quiz performance, with people in the

[3] The unexpected marginal relationship between the low objective elaboration conditions may be in part due to the low reliability of the quiz score measure.

high objective elaboration condition performing better than people in the pooled low objective elaboration conditions.

Objective Elaboration Check 2: Relevant Cognitive Responses. Another manipulation check was performed to examine if participants in the objective elaboration condition produced more message-relevant thoughts compared to participants in the distracted conditions. A one-way ANOVA with condition as the independent variable and relevant cognitive responses as the dependent variable ultimately revealed no significant differences by condition, $F(2, 176)=.92$, $p=.402$, $\eta^2=0.002$. Thus, the manipulations did not have a significant effect on the amount of relevant cognitive responses, and indeed, the means appear to be quite similar.[4] For more detailed information, the associated means and standard deviations by condition for relevant cognitive responses can be found in the third row of Table 1. Note that although the groups did not differ, participants listed about five relevant thoughts across conditions, indicating that they were likely able to at least somewhat elaborate in response to the persuasive message.

Time 1 Measures

The following analyses were intended to establish that the attitudes and intentions created in the first phase of the study were not significantly different across conditions despite also intending for underlying differences in objective and subjective elaboration to occur.

Time 1 Attitudes. A one-way ANOVA with condition as the independent variable and Time 1 attitudes as the dependent variable was conducted to examine if there were differences in Time 1 attitudes toward cannabis legalization, which was not expected. The analysis revealed no significant differences in attitudes between conditions, $F(2, 177)=0.13$, $p=.879$, $\eta^2=.001$. For

[4] Although not predicted, perhaps participants in the low objective-high subjective condition compensated for their lack of *ability* to produce relevant cognitive responses with their *motivation* to demonstrate that they had indeed thought deeply.

more detailed information, the associated means and standard deviations by condition for Time 1 attitudes can be found in the first row of Table 2. These results suggest that participants' initial attitudes toward cannabis legalization were relatively positive and did not greatly differ.

Table 2: Descriptive statistics for the Time 1 attitude and intention measures, consisting of means (M) and standard deviations (SD) for each of the three conditions (Study 1)

	Condition 1 High Objective		Condition 2 Low Obj, High Sub		Condition 3 Low Obj, Low Sub	
	M	*SD*	*M*	*SD*	*M*	*SD*
Attitudes	5.211	1.454	5.085	1.654	5.183	1.155
Behavioral Intentions	4.454	1.630	4.245	1.795	4.226	1.576

Time 1 Behavioral Intentions. Next, a one-way ANOVA with condition as the independent variable and Time 1 intentions as the dependent variable was conducted to determine if there were differences in Time 1 behavioral intentions related to cannabis legalization. The analysis revealed no significant differences in behavioral intentions between the high objective elaboration condition, the low objective-high subjective condition, and the low objective-low subjective condition, $F(2, 177)=0.34$, $p=.709$, $\eta^2=.004$. For more detailed information, the associated means and standard deviations by condition for Time 1 intentions can be found in the second row of Table 2. In sum, participants' initial intentions related to cannabis legalization were moderately positive and did not greatly differ across the three conditions.

Time 2 Measures

Having addressed the manipulations and Time 1 measures, the analysis now turns to the central substantive question of this research, which was to test whether variations in objective and subjective elaboration confer differences in resistance to persuasion using two dependent variables: attitudes and behavioral intentions. For both attitudes and intentions, because participants largely started with positive attitudes and then received a negative message, lower scores represent more negative attitudes and intentions and thus increased persuasion.

Time 2 Attitudes. An ANCOVA with condition as the independent variable, Time 2 attitudes as the dependent variable, and Time 1 attitudes as the covariate revealed a significant effect of the covariate, $F(1, 175)=162.08$, $p<.001$, $\eta^2_p=.479$, indicating that Time 1 attitudes strongly predicted Time 2 attitudes. However, there was no significant effect of condition, $F(2, 175)=0.76$, $p=.468$, $\eta^2_p=.009$, indicating no significant differences in Time 2 attitudes between conditions after controlling for Time 1 attitudes. For more detailed information, the estimated marginal means and standard errors by condition can be found in row 1 of Table 3. This table is organized similarly to the previous tables, with columns representing the three study conditions and rows representing the two Time 2 measures. As can be seen in this table, the three means are nearly identical across the three conditions, indicating that neither objective nor subjective elaboration significantly impacted resistance to persuasion. However, it can also be noted that Time 2 attitudes were approximately one scale point lower than Time 1, indicating that the persuasive message was still effective in shifting participant attitudes.

Table 3: Descriptive statistics for the Time 2 attitude and intention measures, consisting of estimated marginal means (M) and standard errors (SE) for the three conditions (Study 1)

	Condition 1 High Objective		Condition 2 Low Obj, High Sub		Condition 3 Low Obj, Low Sub	
	M	*SE*	*M*	*SE*	*M*	*SE*
Attitudes	4.088	0.125	4.010	0.123	3.868	0.130
Behavioral Intentions	3.744	0.120	3.711	0.117	3.611	0.124

Time 2 Behavioral Intentions. An ANCOVA with condition as the independent variable, Time 2 intentions as the dependent variable, and Time 1 intentions as the covariate revealed a significant effect of the covariate, $F(1, 175)=440.78$, $p<.001$, $\eta^2_p=.72$, indicating that Time 1 intentions strongly predicted Time 2 intentions. However, there was no significant effect of condition, $F(2, 175)=0.32$, $p=.727$, $\eta^2_p=.0036$, indicating no significant differences in Time 2 behavioral intentions between the conditions after controlling for Time 1 intentions. For more detailed information, the means and standard errors by condition can be found in the second row of Table 3. As can be seen in this table, the three means are nearly identical across the three conditions, indicating once again that neither objective nor subjective elaboration significantly impacted resistance to persuasion. However, it can also be noted that Time 2 intentions were predominantly more than a half scale point lower than Time 1 intentions, indicating that the persuasive message was still effective in shifting participant intentions.

Discussion

Overall, the manipulation checks provided reasonable evidence that subjective elaboration was successfully manipulated, with participants in the high subjective elaboration condition reporting significantly higher levels of perceived elaboration compared to participants in the low subjective elaboration condition. However, the evidence for the success of the objective elaboration manipulation was somewhat mixed. Although quiz performance showed the expected pattern, the cognitive responses task did not reveal significant differences between conditions, suggesting that the manipulation of objective elaboration may not have been entirely successful.

Regarding the primary outcomes, the results were not consistent with the expectation that participants in the high subjective elaboration condition would show more resistance to persuasion by having more positive attitudes and intentions than the low subjective elaboration conditions due to increased levels of motivation. Likewise, the results did not indicate that objective elaboration conferred added resistance. Thus, the observed pattern of effects did not provide strong evidence for unique effects from objective or subjective elaboration in promoting resistance to persuasion in terms of attitudes or behavioral intentions.

Several important limitations that were present in this study should be noted. First, although subjective elaboration was manipulated, the fact that participants in the high objective elaboration condition reported comparatively high levels of subjective elaboration implied that our participants had at least some awareness as to their variations in elaboration. However, the question remains as to what the results would have looked like if participants in the high-objective, ambiguous subjective condition had their subjective perceptions of their elaboration further bolstered with explicit feedback indicating they had indeed deeply elaborated. Perhaps providing such feedback would have produced even more dramatic differences in subjective elaboration than was observed in this study, which may have translated into observed differences in resistance to persuasion. Regarding the manipulation of objective elaboration, the low reliability of some of the measures (i.e., quiz performance) may help to explain the null effects, although the lack of significant effects for the cognitive response measure indicates that this is not a comprehensive explanation—perhaps the manipulation itself is not optimal for this design.

Additionally, to further disentangle the effects of objective and subjective elaboration, it would have been ideal to include a condition in which objective elaboration was high and subjective elaboration was manipulated to be low. The lack of this condition, along with a true "high objective, high subjective" condition, precluded a full factorial examination of these two types of elaboration. With these conditions, I could have examined if both the ability and motivation to resist were necessary to confer noticeable resistance effects, which would have indicated that the interaction between objective and subjective elaboration was where the true power to resist resided.

Taken together, these limitations suggest that although the manipulations may have worked to some extent, they were likely too weak to produce downstream effects on resistance to persuasion. However, by explicitly crossing and manipulating both objective and subjective elaboration in the next study, I should be able to disentangle the effects of these two types of elaboration more clearly and potentially uncover differences in resistance-based persuasion outcomes. Therefore, in Study 2, I attempted to address these limitations by using a 2x2 factorial design to fully cross the high and low levels of objective and subjective elaboration and explore the potential interactive effects between them.

Chapter 3

Study 2

The primary aim of Study 2 was to address some of the limitations of Study 1 by employing a 2x2 factorial design that fully crossed high and low levels of objective and subjective elaboration. In addition to this 2x2 design, several other attempts to improve various aspects of the study were undertaken. First, a cognitive response task was added after the Time 2 persuasive message, so that the cognitive responses participants generated after this second message could be assessed. An explicit source was also added to the persuasive messages, which was deliberately selected to be highly credible, so that the source could serve as a positive peripheral cue. The addition of this credible source afforded a peripheral cue that the message was strong to participants who did not carefully process the message (Petty & Cacioppo, 1986).

Method

Participants

Participants consisted of 178 Queen's students who completed the study for course credit. Data collection continued until the end of the academic year to maximize sample size, with a predetermined minimum threshold of 200 participants that was comparable to previous research (Barden & Petty, 2008). Four participants were excluded from the final analysis based on the same criteria as Study 1 of minimum study progress. After applying these criteria, data from 174 participants were retained for the final analysis. Although this fell slightly short of our desired sample size, the results were still analyzed because data collection had been completed for the semester. Among these participants, the demographic profile was similar to other studies at Queen’s: 38 participants were men, 136 were women, 139 identified as

White/Caucasian/European, 16 as East Asian (e.g., Chinese, Korean, Japanese, etc.), 4 as Black/African, and 15 as not specified/other.

Procedure

Upon arriving at the lab, participants were seated at individual computer stations separated by partitions to minimize distractions. All study materials were presented on the computer using the Qualtrics survey platform (for all ethics related materials for Study 2, see Appendix C. For all materials and measures for Study 2, see Appendix D). Participants were randomly assigned to levels of objective elaboration and levels of subjective elaboration, resulting in one of four possible combinations of conditions across the study: high objective-high subjective elaboration, high objective-low subjective elaboration, low objective-high subjective elaboration, or low objective-low subjective elaboration. Please note that each of the sections that follow were presented to participants in the same fixed sequence as discussed.

Phase 1: Inducing Targeted Attitudinal Properties

Similar to Study 1, the first goal of phase 1 was to ensure that attitudes towards legal cannabis were generally positive across conditions to allow room for persuasion to occur. However, although these attitudes should not differ across conditions, the second goal of phase 1 was to create underlying differences in the objective and subjective elaboration underlying these comparable attitudes.

Manipulation of Objective Elaboration. Participants in the low objective elaboration condition underwent a distraction task involving abstract artwork at the start of the study, which corresponded to a picture recall task at the end of the study. Participants in the high objective elaboration condition were also shown the artwork; however, the picture recall task was administered immediately after the artwork was shown to ensure that the manipulations were similar across conditions but did not interfere with objective elaboration for participants in the high objective condition.

Pro-attitudinal Message. Following the distraction task, all participants read the same persuasive message as was used in Study 1, which was in favor of cannabis legalization in Canada. This message contained strong arguments supporting legalization from an ostensibly credible source (Terry Newman, Ph.D., McGill University), with the goal of having participants hold comparably positive attitudes across conditions as well as to create the opportunity for differences to emerge in the extent of objective and subjective elaboration.

Quiz on the Pro-attitudinal Message. Similar to Study 1, after reading the message, participants completed a 10-item multiple choice quiz assessing their recall of the key arguments. The first purpose of the quiz was to use participant performance as a basis for false feedback to manipulate subjective elaboration, whereas the second goal of the quiz was to score it as a manipulation check of objective elaboration, as participants in the low objective elaboration condition (who were distracted by the artwork) should theoretically perform worse on the quiz compared to participants in the high objective elaboration condition who were not distracted.

Manipulation of Subjective Elaboration. After submitting their quiz responses, participants received false feedback about their performance as part of the subjective elaboration manipulation in the same manner as was performed in Study 1. This manipulation aimed to influence participants' perceptions of their own elaboration irrespective of the actual extent of elaboration by telling them they either had thought deeply or had not.

Phase 1 Measures. Following the manipulation of subjective elaboration, all participants completed measures of their Time 1 attitudes, a manipulation check of subjective elaboration (perceived elaboration measure), Time 1 attitude certainty and behavioral intentions. They next completed a manipulation check of objective elaboration (relevant cognitive responses). Please note that in Study 1, the perceived elaboration measure came after the Time 1 measures of attitudes, certainty and intentions, but for Study 2, the perceived elaboration measures come after Time 1 attitudes but before Time 1 certainty and intentions.

Phase 2: Testing Resistance to Persuasion

Similar to Study 2, having set-up comparably positive attitudes and differences in objective and subjective elaboration across conditions during phase 1, the goal of phase 2 was to present participants with a counter-attitudinal message to see if resistance to persuasion differed across the conditions.

Counter-Attitudinal Message. In the second phase of the study, all participants read the same counter-attitudinal message as was used in Study 1. This persuasive message presented strong arguments against cannabis legalization from an ostensibly credible source (Rick Doblen, Ph.D., University of Toronto), with the goal of differentially persuading participants on the basis of their levels of objective and subjective elaboration.

Phase 2 Measures. Following the counter-attitudinal message, participants completed measures of their Time 2 attitudes, attitude certainty, and behavioral intentions. However, unlike in Study 1, all participants completed an additional measure of relevant cognitive responses regarding the second persuasive message after reporting their Time 2 intentions.

Picture Recall. Next, to align with the cover story and ensure participants were following instructions, participants in the low objective elaboration condition who were distracted by the artwork were to report the number of discrete objects they could remember from the image. Additional questions about the image were also asked to disguise the manipulation and were not intended to be useful measures. Participants in the high objective elaboration condition completed this task right after being shown the abstract artwork earlier in the study.

Debriefing

After finishing the recall task, participants were thanked for their time and fully debriefed at the end of the experimental session. The debriefing explained the true purpose of the study, the rationale behind the manipulation of objective and subjective elaboration, and why deception was necessary to test the hypotheses. Participants were given the opportunity to ask any questions they had about the research before being dismissed.

Measures

Each of the measures that follow were presented to participants in the same fixed sequence as discussed. Unless otherwise noted, these measures were identical to those used in Study 1.

Manipulation Check of Objective Elaboration: Quiz Score. Participant scores on the quiz served as a manipulation check on the objective elaboration manipulation and had the following distributional and psychometric properties (M = 6.333, SD = 1.603, skewness = -0.247, kurtosis = -0.124, α = .40).[5]

Time 1 Attitudes. The measure of Time 1 attitudes had the following distributional and psychometric properties (M = 5.197, SD = 1.190, skewness = -0.300, kurtosis = -0.522, α = .95).

Manipulation Check of Subjective Elaboration: Perceived Elaboration. The measure of perceived elaboration had the following distributional and psychometric properties (M = 2.305, SD = 0.757, skewness = -0.043, kurtosis = -0.425, α = .75).

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[5] As noted previously, this falls below the traditional threshold of what would normally be considered good reliability (e.g., >.70; Nunnally, 1978).

Time 1 Certainty. The Time-1 attitude certainty measure had the following distributional and psychometric properties (*M* = 4.923, *SD* = 1.326, skewness = -0.572, kurtosis = 0.451, α = .95). Please note that the analyses for Time 1 certainty are not included in the results section as they were included for exploratory purposes; however, they can be found at the end of this document (i.e., Appendix F).

Time 1 Intentions. The Time 1 behavioral intentions measure had the following distributional and psychometric properties (*M* = 4.495, *SD* = 1.529, skewness = -0.268, kurtosis = -0.752, α = .81).

Manipulation Check of Objective Elaboration: Amount of Relevant Cognitive Responses (Time 1). The amount of Time 1 relevant cognitive responses had the following distributional and psychometric properties (*M* = 4.621, *SD* = 2.536, skewness = 0.282, kurtosis = -0.541). Responses were blindly coded and scored by the author and partially coded by a separate independent coder in the same way as Study 1. The interrater reliability of the response sets assessed by both coders was r=.878

Time 2 Attitudes. The Time 2 attitude measure had the following distributional and psychometric properties (*M* = 4.192, *SD* = 1.194, skewness = 0.012, kurtosis = 0.123, α = .91).

Time 2 Certainty. The Time 2 certainty measure had the following distributional and psychometric properties (*M* = 4.923, *SD* = 1.326, skewness = -0.572, kurtosis = 0.451, α = .97). The analyses for Time 2 certainty are not included in the results section as they were included for exploratory purposes; however, they can be found at the end of this document (i.e., Appendix F).

Time 2 Intentions. The Time 2 intention measure had the following distributional and psychometric properties (*M* = 3.906, *SD* = 1.619, skewness = 0.104, kurtosis = -0.775, α = .88).

Time 2 Amount of Relevant Cognitive Responses. The amount of Time 2 relevant cognitive responses had the following distributional and psychometric properties (M = 4.615, SD = 2.364, skewness = 0.323, kurtosis = -0.099). Responses were blindly coded and scored by the author and partially coded by a separate independent coder in the same way as Study 1. The interrater reliability of the response sets assessed by both coders was r=0.920.

Time 2 Valence of Cognitive Responses. To assess the valence of participant responses to determine the degree of counter-arguing, relevant thoughts participants generated were categorized as either positive, neutral, or negative. After being categorized, positive relevant responses were subtracted from negative responses and divided by the total number of relevant thoughts to elucidate if participants accepted the message and generated thoughts congruent with it or if they generated counterarguments. More specifically, this analysis sought to clarify if participants high in either objective or subjective elaboration engage in more counterarguing to help explain resistance effects. The counterarguing index from Time 2 relevant cognitive responses had the following distributional and psychometric properties (M = 0.150, SD = 0.661, skewness = -0.277, kurtosis = -1.055). Responses were blindly coded and scored by the author and partially coded by a separate independent coder in the same way as Study 1. The interrater reliability of the response sets assessed by both coders was r=0.928.

Picture Recall. This measure was assessed and scored the same way as Study 1, except for in this Study, participants in the high objective elaboration condition completed it at the start of the study whereas participants in the low objective condition completed it at the end. The distributional and psychometric properties of the picture recall measure were as follows for the high objective elaboration condition (M = 4.865, SD = 2.496, skewness = -0.128, kurtosis = -0.794), and were as follows for the low objective elaboration condition (M = 4.614, SD = 2.444, skewness = -0.066, kurtosis = -0.457), indicating that participants in both conditions were engaging with the task as instructed.

Results

Manipulation Checks

The first set of analyses was intended to verify the success of the experimental manipulations.

Subjective Elaboration Check: Perceived Elaboration. An initial analysis was conducted to determine if the manipulation of perceived elaboration was successful. A 2x2 ANOVA with objective elaboration and subjective elaboration as the independent variables and perceived elaboration as the dependent variable revealed a significant main effect of subjective elaboration, $F(1, 169)=10.64$, $p=.001$, $\eta^2 p = .059$. More specifically, participants in the high subjective elaboration condition reported higher levels of perceived elaboration ($M=2.60$, $SE=0.076$) compared to those in the low subjective elaboration condition ($M=2.02$, $SE=0.074$).

As expected, there was no significant main effect of objective elaboration, $F(1, 169)=0.34$, $p=.559$, $\eta^2_p = .002$. This was expected because subjective elaboration was specifically manipulated in every study condition, suggesting that the false feedback used was powerful enough to drive perceptions of subjective elaboration even if participants had genuine insight into their levels of objective elaboration. Likewise, there was also no significant interaction effect, $F(1, 169)=0.89$, $p=.348$, $\eta^2_p = .005$. Similar to the prediction for the main effect of objective elaboration, an interaction was not expected but was conceivably possible by having both objective and subjective elaboration aligned to maximally influence perceived elaboration. These results suggest that the manipulation of subjective elaboration was sufficiently strong that it overrode any effects of objective elaboration on subjective perceptions (or that people lack sufficient insight into these perceptions), while objective elaboration did not significantly influence perceived elaboration.

Objective Elaboration Check 1: Quiz Performance. An analysis was conducted as a manipulation check of the distraction intervention's effect on elaboration by determining if those in the high objective elaboration condition performed better on a quiz than those in the low objective elaboration condition who were distracted. A 2x2 ANOVA with objective elaboration and subjective elaboration as the independent variables and quiz score as the dependent variable revealed that there was no significant main effect of objective elaboration, $F(1, 170)=1.88$, $p=0.172$, $\eta^2_p=.011$. Although this was not significant, the relevant means were examined to determine if trends were following the expected direction (scaling=0-10). These means demonstrated that participants in the high objective elaboration condition performed non-significantly better on the quiz ($M=6.60$, $SE=0.167$) compared to those in the low objective elaboration condition ($M=6.04$, $SE=0.175$).

As expected, as this measure was before the subjective manipulation, there was no significant main effect of subjective elaboration, $F(1, 170)=0.01$, $p=.960$, $\eta^2_p<.001$. Likewise, no interactions were expected nor found, $F(1, 170)=0.15$, $p=.703$, $\eta^2_p=.001$. These results offer suggestive evidence that the manipulation of objective elaboration was not particularly successful. Furthermore, the internal reliability of the quiz score measure was lower than in Study 1, which was already poor to begin with (i.e., $\alpha=.52$ in study 1, while $\alpha=.40$ in Study 2). To clarify, an alpha level that is below .70 is rarely considered acceptable (Nunnally & Bernstein, 1994).

Objective Elaboration Check 2: Amount of Relevant Cognitive Responses at Time 1. Another manipulation check was performed to examine if those in the high-objective elaboration condition produced more message-relevant thoughts compared to those in the low-objective, distracted condition after the first persuasive message using a two-way ANOVA with objective and subjective elaboration as the independent variables and amount of relevant cognitive responses as the dependent variable. Of primary interest in this analysis was the main effect of objective elaboration, of which the analysis showed that there was no significant main effect of objective elaboration, $F(1, 170)=0.48$, $p=.491$, $\eta^2p =.003$. Although the means were in the expected direction, with those in the high objective condition providing non-significantly more relevant thoughts (M=4.71, SE=0.266) than those in the low objective condition (M=4.51, SE=0.277), given the weakness of this effect, no strong claims can be made. For subjective elaboration, there was no specific expectation, and indeed there was no significant main effect of subjective elaboration, $F(1, 170)=0.01$, $p=.934$, $\eta^2p < .001$. Similarly, there were no specific predictions regarding the interaction, which was not significant, $F(1, 170)=2.23$, $p=.131$, $\eta^2p =.013$. In total, this manipulation check did not provide strong evidence that the objective elaboration manipulation significantly affected the number of relevant cognitive responses at Time 1.

Time 1 Measures

The following analyses were intended to establish that attitudes and intentions created across conditions in the first phase of the study did not differ, despite also intending for underlying differences in objective and subjective elaboration to occur.

Time 1 Attitudes. A 2x2 ANOVA with objective elaboration and subjective elaboration as the independent variables and Time 1 attitudes as the dependent variable revealed no significant main effects of objective elaboration, $F(1, 170)=0.02$, $p=.891$, $\eta^2_p <.001$, or subjective elaboration, $F(1, 170)=1.22$, $p=.271$, $\eta^2_p =.007$, and no significant interaction effect, $F(1,$

170)=1.23, p=.270, η^2_p =.007. This was as predicted, as the goal of Phase 1 was to create attitudes among all participants that did not significantly differ. The results suggest that participants' initial attitudes toward cannabis legalization were relatively positive and did not significantly differ across levels of the objective and subjective factors.

Time 1 Behavioral Intentions. Next, A 2x2 ANOVA with objective and subjective elaboration as the independent variables and Time 1 intentions as the dependent variable revealed no significant main effects of objective elaboration, $F(1, 169)=0.13$, p=.722, η^2p <.001, or subjective elaboration, $F(1, 169)=0.88$, p=.348, η^2p =.005, and no significant interaction effect, $F(1, 169)<0.001$, p=.991, η^2p <.001. The lack of differences in intentions was as predicted, as the goal of Phase 1 was to create behavioral intentions among participants that did not significantly differ. More specifically, the descriptive statistics for participant intentions at Time 1 were as follows: high in objective factor (M=4.55, SD=0.162), low in objective factor (M=4.43, SD=0.168), high in subjective factor (M=4.34, SD=0.167), and low in subjective factor (M=4.64, SD=0.163). These results suggest that participants' initial behavioral intentions related to cannabis legalization were moderately positive and did not differ significantly across levels of the objective and subjective factors.

Time 2 Measures

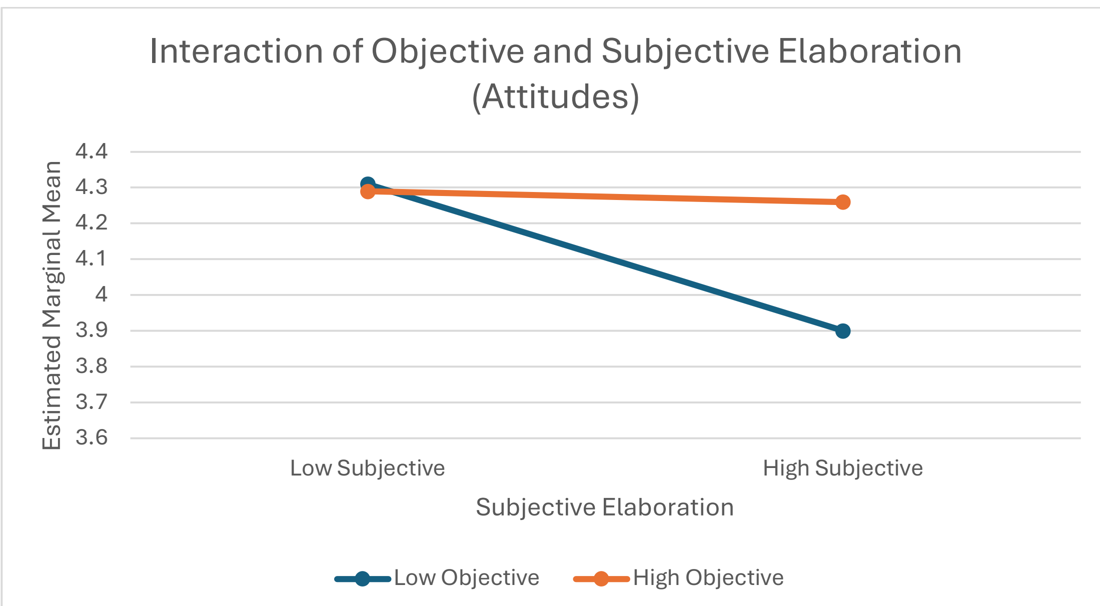
Having discussed the manipulations, the analysis now turns to the central substantive question of this research, which was to test whether variations in objective and subjective elaboration confer differences in resistance to persuasion with two dependent variables: attitudes and behavioral intentions. For both attitudes and intentions, because participants largely started with positive attitudes and then received a negative message, lower scores represent more negative attitudes and intentions and thus increased persuasion.

Time 2 Attitudes. A 2x2 ANCOVA with objective elaboration and subjective elaboration as the independent variables, Time 2 attitudes as the dependent variable, and Time 1 attitudes as the covariate revealed a significant effect of the covariate, $F(1, 166)=190.47$, $p<.001$, $\eta^2_p=.534$, indicating that Time 1 attitudes strongly predicted Time 2 attitudes. Time 2 attitudes were approximately one scale point lower than Time 1, indicating that the persuasive message was effective in shifting participant attitudes.

The primary question of interest was if objective or subjective elaboration conferred any enhanced resistance. However, unlike what was predicted, there was no significant main effect of objective elaboration, $F(1, 166)=1.96$, $p=.164$, $\eta^2_p=.011$. However, the associated means were in the expected direction, as the high objective condition had a non-significantly higher mean ($M=4.28$, $SE=0.087$) than the low objective condition ($M=4.10$, $SE=0.089$), although no claims can be made given the non-significance of this effect. Likewise, there was no significant main effect of subjective elaboration, $F(1, 166)=3.19$, $p=.076$, $\eta^2_p=.019$, although this effect was marginal. An examination of the means reveals that they were in the opposite direction as predicted, with the high subjective condition having a lower mean ($M=4.08$, $SE=0.089$) than the low subjective condition ($M=4.30$, $SE=0.087$), surprisingly indicating a nonsignificant tendency for enhanced resistance with lower levels of subjective elaboration. Finally, although not predicted but deemed possible, there was no significant interaction effect, $F(1, 166)=2.25$, $p=.135$, $\eta^2_p=.013$. This non-significant interaction is presented visually in Figure 1.

If an interaction were to be present, it was expected that it would be the combination of high objective and high subjective elaboration that led to the disproportionately greatest increase in persuasive resistance (i.e., both ability and motivation are required for maximal resistance). However, the interaction, although non-significant, shows similar levels of resistance for all conditions except for the low objective, high subjective condition, which shows the lowest level of resistance among the various conditions (i.e., the most persuasion). Overall, the analysis of Time 2 attitudes found suggestive evidence that subjective elaboration can influence resistance to persuasion; however, this effect was marginal and in the opposite of the expected direction. In addition, although trending in the expected direction, the predicted effect of objective elaboration influencing resistance to persuasion did not convincingly emerge. Taken together, the analysis of Time 2 attitudes did not yield results that were consistent with any pre-existing hypotheses and remain difficult to explain.

Figure 1



Time 2 Behavioral Intentions. A 2x2 ANCOVA with objective and subjective elaboration as the independent variables, Time 2 intentions as the dependent variable, and Time 1 intentions as the covariate revealed a significant effect of the covariate, $F(1, 166)=586.54$, $p<.001$, $\eta^2_p=.779$, indicating that Time 1 intentions strongly predicted Time 2 intentions. Time 2

intentions were more than a half scale point lower than Time 1 intentions, indicating that the persuasive message was effective in shifting participant intentions.

The primary question of interest was if objective or subjective elaboration conferred any enhanced resistance. However, unlike what was predicted, there was no significant main effect of objective elaboration, $F(1, 166)=0.52$, $p=.474$, $\eta^2_p=.003$. An examination of the means reveals that they are nearly identical, with the high objective condition ($M=3.94$, $SE=0.081$) and the low objective condition ($M=3.86$, $SE=0.083$) showing no meaningful differences. For subjective elaboration, there was also no significant main effect, $F(1, 166)=3.73$, $p=.055$, $\eta^2_p=.022$, although this effect was indeed marginal. However, the means were in the opposite direction as predicted, with the high subjective condition having a lower mean ($M=3.79$, $SE=0.083$) than the low subjective condition ($M=4.01$, $SE=0.081$). The higher means observed for the low subjective elaboration condition surprisingly indicate enhanced resistance with lower levels of subjective elaboration, which is similar to the pattern observed for the Time 2 attitudes measure. Finally, although not predicted, there was no significant interaction effect, $F(1, 166)=<0.001$, $p=.991$, $\eta^2_p<.001$. Overall, the analysis of Time 2 intentions indicated that while the persuasive message was effective at reducing participant intentions to support legal cannabis, objective elaboration did not significantly impact resistance to persuasion. Furthermore, while subjective elaboration did appear to impact resistance, this effect was marginal and in the opposite of the expected direction.

Time 2 Cognitive Response Measures

Time 2 Valence of Cognitive Responses. For the analysis of counterarguing regarding the second set of relevant cognitive responses, a 2x2 ANOVA was conducted with objective and subjective elaboration as the independent variables and counterarguing as the dependent variable.

There was no significant main effect of subjective elaboration, $F(1, 161)=1.49$, $p=.223$, η^2_p $=.009$. The next effect of interest was the main effect of objective elaboration, in which there was no significant main effect of objective elaboration, $F(1, 161)=0.19$, $p=.667$, $\eta^2_p =.001$. The final effect of interest was the interaction effect, which was not significant as expected, $F(1, 161)<0.001$, $p=.987$, $\eta^2_p < .001$.

Time 2 Amount of Relevant Cognitive Responses. For the second set of relevant cognitive responses, which were provided after the second persuasive message against legal cannabis, a 2x2 ANOVA was conducted with objective and subjective elaboration as the independent variables and amount of relevant cognitive responses as the dependent variable. There was no significant main effect of subjective elaboration, $F(1, 170)=0.12$, $p=.728$, $\eta^2 p <.001$, no significant main effect of objective elaboration, $F(1, 170)=0.77$, $p=.382$, $\eta^2 p =.004$, and no significant interaction effect, $F(1, 170) =0.83$, $p=.365$, $\eta^2 p =.005$. These results suggest that the amount of Time 2 relevant cognitive responses was not related to the levels of objective and subjective elaboration.

Discussion

The results of Study 2 did not provide clear evidence for any of the hypothesized effects regarding the influence of objective and subjective elaboration on resistance to persuasion. Although the manipulation of subjective elaboration was likely successful based on the manipulation check of perceived elaboration, the manipulation of objective elaboration may not have been fully effective because the quiz performance measure showed little support for a successful manipulation of objective elaboration and also due to the fact that the cognitive response measure did not support the idea that objective elaboration was successfully manipulated. Regarding the primary outcomes, no consistent support was found for enhanced resistance on account of differing levels of either objective or subjective elaboration on either attitudes or intentions, although both measures showed a marginal tendency for increasing levels of subjective elaboration to decrease resistance to persuasion, which was contrary to expectations. Overall, Study 2 failed to provide clear support for any of the main hypotheses regarding the roles of objective and subjective elaboration in regard to persuasive resistance.

Chapter 4

General Discussion

Summary of findings

Regarding the primary independent variables, both studies demonstrated success in manipulating subjective elaboration, as participants in the high subjective elaboration conditions consistently reported higher levels of perceived elaboration. However, less is certain for objective elaboration, as no clear evidence suggests that objective elaboration was successfully manipulated across both studies. More critically, both studies revealed no evidence that either objective or subjective elaboration significantly influenced resistance to persuasion. Specifically, objective elaboration did not show meaningful resistance effects across the two studies, and although subjective elaboration did lead to marginal resistance in Study 2, this effect was in the opposite of the expected direction and did not emerge in the first study. Therefore, these two studies failed to provide clear evidence regarding the relationship between objective and subjective elaboration and resistance to persuasion.

Implications

The lack of evidence from these studies for the hypothesized effects of objective and subjective elaboration raise several important questions regarding the implications of the findings. The first question is that the observed effects are valid and no meaningful effects exist for objective or subjective elaboration on persuasive resistance. While possible, this interpretation would be quite contrary to the prior findings in the persuasion literature, which have consistently demonstrated the central importance of elaboration with respect to attitude strength in general, as well as resistance to persuasion more specifically (Petty & Cacioppo, 1986; Petty et al., 1995). For instance, many past studies have demonstrated that persuasive resistance increases as a function of the extent of elaboration (Petty et al., 1995; Haugtvedt & Petty, 1992; Haugtvedt & Wegener, 1994). However, it is unclear how much of these prior effects were due to objective or subjective elaboration. For instance, perhaps previously documented effects of increased resistance on the part of elaboration are due to the belief that participants had thought deeply rather than the actual extent of their elaboration. Alternatively, these effects may emerge due to objective elaboration and may not depend on subjective elaboration. However, in either case, the past literature suggest that either objective or subjective elaboration (or both) lead to increased resistance to persuasion. Why then did the results of the present studies suggest that neither objective nor subjective elaboration contribute to persuasive resistance? Given this well-established body of pre-existing evidence, I will examine the possibility that the studies presented in this thesis did not find significant results on account of methodological limitations rather than theoretical misconceptions.

In considering such potential limitations, one possible explanation for the null findings from these studies is the presence of a floor effect of attitude change, which could be caused by using a persuasive messages that was not of a sufficient quality to effectively change participant's strongly positive initial attitudes. If participants are not at all swayed by the message, variation in persuasive resistance on account of independent variables like elaboration is unlikely to emerge. However, contrary to this notion, the persuasive message was effective at shifting participant attitudes and intentions by a half to full scale point in both Study 1 and Study 2, indicating that the experimental paradigm as it stands is indeed capable of producing changes in participant attitudes and intentions, implying that the lack of resistance effects observed in these studies were not due to a failure to effectively persuade participants with the messages that were utilized.

An alternative possibility for the lack of significant results is the presence of a ceiling effect, which could be caused by using a very strong persuasive message that entirely changes all participant's positive but weak initial attitudes. If participants are all maximally changed by the message, variations in elaboration are unlikely to account for differences in resistance due to few differences in how participants respond to the persuasive messages to begin with. However, the potential for participants to have their attitudes further changed at the end of the study effectively rules out this possibility, as participant attitudes towards legal cannabis start at relatively positive levels and generally do not decrease by more than one scale point. Taken together, ceiling and floor effects do not appear to account for the lack of meaningfully interpretable results across the two studies.

In considering other reasons for the lack of findings from these studies, a more convincingly plausible explanation than described thus far is that the key independent variables of objective and subjective elaboration were not properly manipulated, thus resistance effects could not effectively emerge. Starting with subjective elaboration, the associated manipulation check was significant across the two studies, but perceived elaboration only increased by about a half scale point for participants intended to be high rather than low in subjective elaboration. In addition, participants in both the high and low levels of subjective elaboration remain in the mid-range of the 0-4 scale, making it difficult to argue that either condition was effectively "high" or "low" in subjective elaboration. Therefore, in future studies, I will bolster the manipulation of subjective elaboration in both the high and low directions to ensure that differences emerging between the various conditions are both significant and meaningful, rather than simply significant.

Moving on the considering the manipulation of objective elaboration, the manipulation checks for this variable across the two studies indicates that it was unlikely to have been effectively manipulated. The quiz performance measure of objective elaboration was significant in study 1, but it was not significant in study 2. While the low internal reliability of this measure may be part of the reason, the amount of relevant thoughts index that was also meant to assess the extent of objective elaboration was not significant in either study. Thus, the distraction task was likely too weak or not effective in creating meaningful differences in objective elaboration across conditions in these two studies. Therefore, like with subjective elaboration, I will also bolster the manipulation of objective elaboration in both the high and low directions to ensure that significant and meaningful differences in resistance to persuasion can emerge across the various assigned conditions of objective elaboration.

Another potential explanation for the null findings across the two studies involves statistical power. For Study 1, a power analysis indicated that 159 participants would be needed to detect a medium-sized effect ($\eta^2 = 0.06$, $f = 0.25$) with $\alpha = 0.05$ and power (β) = 0.80. With 180 retained participants, this threshold was comfortably met. Similarly, for Study 2, a separate power analysis indicated that 180 participants would be required to achieve similar power levels for medium-sized effects at the same significance level—although this many participants were recruited, only 176 were retained for final analysis. Although this is still very close, the increased complexity of Study 2 compared to Study 1 (i.e., four conditions vs three) warrants that it should have a higher number of participants, when in actuality, it had less. While both studies were likely powered to detect medium effects, elaboration effects in the literature sometimes fall in the small-to-medium range (e.g., $f = 0.10$–0.20; Petty & Goldman, 1981). If the effects of objective and subjective elaboration are smaller than anticipated, the sample sizes of both studies may not have been sufficiently powered to detect them.

A final structural explanation for the lack of significant effects from these two studies relates to the timing of the picture recall task for participants intended to be low in objective elaboration. In both studies, participants begin the experiment by being assigned to either high or low levels of objective elaboration, which is manipulated by the presentation of a distracting image that participants are told they will later be tested on. In the ideal design for the two studies, these picture recall questions should be asked after the first persuasive message but before the second persuasive message, as this is the only time objective elaboration was intended to be manipulated. If the questions were asked at this time, participants would know the distracting image was no longer relevant and thus it should no longer affect their objective elaboration throughout the study. Although the distraction task would likely be most salient at the start of the study, participants may have recalled that this picture task was still relevant during the later part of the study because they had not yet been asked the promised questions about the image. These questions about the image were still not asked, so participants in the low elaboration condition may have still processed the second persuasive message under low elaboration conditions rather than more normal conditions; because of this, it appears they are resisting persuasion due to a lack of attitude change, when in reality they may have been too distracted to understand and interpret the message content.

In summary, the low elaboration condition may have started with relatively weak positive attitudes (because they were under low elaboration during the first persuasive message in support of legal cannabis) and maintained relatively weak positive attitudes because they were not strongly challenged (as they were kept under low elaboration during the second persuasive message against legal cannabis). However, the high elaboration condition may have started with relatively stronger positive attitudes (as they were able to fully process the first persuasive message in support of legal cannabis) and had less positive attitudes after the second persuasive message (as they were able to fully elaborate during the second persuasive message against legal cannabis). Thus, Time 2 attitudes likely varied on how effectively participants could process the strong counter-attitudinal message, potentially canceling out effects that may have otherwise emerged on the basis of differences in elaboration during Time 1.

Future Directions

In considering the next phase of this program of research, several limitations already noted are intended to be addressed in the hopes that meaningful effects can eventually be uncovered. Going into the future, the first reasonable direction appears to be to attempt finding the hypothesized effects by improving the studies themselves. To this end, one of the first priorities for future studies in this line of research is to strengthen the manipulations of both objective and subjective elaboration. In terms of subjective elaboration, future studies could explore strategies such as using more personalized and believable false feedback. Alternatively, various sources could be used to increase or decrease the perceived subjective elaboration in participants, such as by using peer evaluation to supplement the quiz performance feedback via a social comparison processes (Festinger, 1954).

In this example, participants could be told that they are being graded on their quiz performance in a manner that is similar to a group project; if the goal is to increase subjective elaboration, the ostensible peer can tell the participant that their performance was the reason the group passed the quiz. Alternatively, if the goal is to decrease subjective elaboration, the peer can tell the participant that their performance was the reason their group did not pass the quiz;

through this manipulation, subjective elaboration should increase or decrease relative to the performance of their hypothetical partner. Regardless of the route taken, the goal of bolstering the subjective elaboration manipulation is to create a condition where participants who are intended to have high levels of subjective elaboration report reasonably high levels of perceived elaboration (e.g., 3 out of 4) and those intended to have low levels of subjective elaboration report reasonably low levels of perceived elaboration (e.g., 1 out of 4).

Just as improving the efficacy of the subjective elaboration manipulation is a fruitful option to enhance future research, improving the objective elaboration manipulation is also sensible; especially because the manipulation checks of objective elaboration indicated it may not have been entirely successful. Thus, to address the goal of decreasing objective elaboration, future research could employ more engaging distraction tasks that intend to place greater cognitive demand on participants so that their objective elaboration is more effectively diminished. For example, rather than simply viewing an abstract image and being told to try to remember it throughout the study, participants could also be tasked with recalling a set of fixed numbers that were presented at the start of the study (Petty et al., 1976). However, this has the potential to overburden participants to the degree that the experiment becomes unreasonable or undesirable to complete; indeed, the distraction manipulation used in these thesis may have failed because it is already too difficult to complete.

Thus, rather than trying to further hinder participant ability to elaborate to drive down objective elaboration, another possibility is to pair the low ability to process manipulation (e.g., the distracting image) with a low motivation to process manipulation (e.g., by decreasing personal responsibility). For example, to further ensure that elaboration will be low, participants who are exposed to the distracting image could also be told that many people are chosen to evaluate the topic of legal cannabis and that their responses may not even be considered by the research team (Petty et al., 1980). Finally, one way to potentially increase the efficacy of the distraction task without overburdening participants is to increase its salience by asking participants questions about the image throughout the study, such as when they are reading the first persuasive message, rather than simply at the end of the first persuasive message.

On a related note, the timing of the picture recall task may have contributed to the lack of significant effects in the current studies. To address this issue, future research should ensure that the picture recall task is administered shortly after (or during) the first persuasive message is processed but before the second persuasive message is presented. This change will ensure that participants in both the high and low elaboration conditions have the opportunity to fully process the counter-attitudinal message, rather than having those in the low elaboration condition process both messages under low elaboration conditions. This change should provide a more accurate assessment of how initial variations in objective and subjective elaboration affect resistance to persuasion when faced with a strong counter-attitudinal message, as the counter-attitudinal message is more likely to be similarly processed by all participants.

Alternative to lowering elaboration, in the interest of increasing objective elaboration, two strategies based on motivation to process that are likely pertinent to the present studies include increasing the personal accountability of the topic or informing participants they are among a select few who were chosen to evaluate the topic at hand (Petty & Cacioppo, 1979; Petty et al., 1980). For example, participants can be told that their university is considering a policy that would allow for legal cannabis to be used on campus or alternatively that the university is considering the implementation of a drug-screening program. This certainly has the potential to increase the perceived relevance of the issue; however, this change appears relatively unrealistic on the surface and may not be widely believed by participants. Therefore, a more realistic manipulation to increase objective elaboration may be to tell participants that they are among a select few participants (or the only participant) who have been selected to evaluate the given topic of cannabis legalization in Canada–this manipulation should theoretically serve to increase participation motivation to think deeply and therefore increase their levels of objective elaboration. In terms of increasing the ability to objectively elaborate, participants in the high objective elaboration conditions of future studies will not be presented with a distraction task that hinders their ability to process the persuasive message. Overall, regardless of the method taken, the overall goal is to create conditions with maximal differences between the extent of objective elaboration in the high and low conditions of the study.

Given the possibility that the methodological improvements described earlier lead to finding the hypothesized effects of objective elaboration, subjective elaboration, or some combination of the two leading to resistance to persuasion, one possible next step in this line of research is to investigate underlying mechanisms and boundary conditions. For example, potential mediators can be explored to further understand the dynamics of the effects, such as the complexity of participant cognitive responses or participant Need for Cognition, which may moderate the effects of objective or subjective elaboration (Petty & Cacioppo, 1986). Additionally, future research could extend such findings into domains beyond the topic of cannabis legalization to strengthen the external validity by establishing the generalizability of the effects. Ultimately, by pursing these possible avenues of investigation, researchers can hope to develop a more comprehensive understanding of the respective role that both objective and subjective elaboration play in resistance persuasion.

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Appendixes

Appendix A (Ethics for Study 1)

CONSENT TO ACT AS A HUMAN RESEARCH SUBJECT: DUST

Leandre Fabrigar, Ph.D.

Department of Psychology, Queen's University

PURPOSE: I have been invited to participate in this research study, titled DUST. I will be asked to complete one or more tasks. I will be asked to read a series of messages and arguments and may be asked to look at some pictures and will be asked various questions about them. The procedure should take no more than 15 minutes for most respondents. Participation is voluntary and I can decline to participate in the research or any aspect of the research at any time without penalty and/or impact on academic standing. I will receive 1.0 extra credits, or $10 if arranged, for my participation in both this study and several other studies that will be included in this session.

RISKS: There are no anticipated risks associated with my participation, but if I feel uncomfortable or distressed, I can reach out to the resources outlined here. Specifically, if I live in Kingston, Ontario I can contact the Telephone Aid Line Kingston (TALK) at 613-544-1771. If I am in Ontario I can text Good2Talk at 686868 or talk to them by calling 1-866-925-5454. If I am outside of Ontario, I can also reach out to EmpowerMe by visiting their website at https://ear.powerflexweb.com/1545/login_SC.html or by phone in North America at 1-844-741-6389.

BENEFITS: I understand that I will not receive any benefit for completing this research study.

CONFIDENTIALITY: Authorized personnel include the researcher mentioned here, as well as the research collaborators working with the principal investigator. Thus, the confidentiality of my information will be maintained now and in the future.

Furthermore, please note that the Queen's General Research Ethics Board (GREB) may request access to study data and/or all other study materials used in this research to ensure that we (the research team) have or are meeting our ethical obligations in conducting this research. GREB is bound by confidentiality agreements and will not release any personal information.

RESEARCH DATA: The information I supply will be kept on a password-protected computer and/or in a locked room to which only authorized personnel will have access and will be anonymized once data collection has completed so as to remove any identifying information. All files containing identifying information will be deleted after the data has been fully integrated.

You should note that although the data will be anonymized, it is possible that your social media information might include sufficient information for some people to deduce your identity. Thus, should you have concerns about this possibility, you should feel free to delete any identifying information in your social media archives prior to sharing it with the researcher. The final data file will be stored indefinitely and will be released upon request to authorized researchers who may access the anonymous data via the Open Science Framework. However, no identifying information will be provided in the dissemination of any work and that a pseudonym or study ID number will be used in any publications or study records. Any research reports resulting from this study will contain no individual data but will rather focus on grouped findings. Results from this research may be presented in a professional journal, book chapter, or at scientific conferences. It may also be posted to an open science repository such as the Open Science Framework (www.osf.io) to help work towards data transparency in psychology. Should I be interested in the researchers' findings, I will be able to obtain a copy of the results upon request.

IF I HAVE QUESTIONS: Any questions about study participation may be directed to Dr. Leandre Fabrigar, at fabrigar@queensu.ca. If you have any ethics concerns, please contact the General Research Ethics Board (GREB) at 1-844-535- 2988 (Toll free in North America) or email chair. GREB@queensu.ca. Call 1-613-5332988 if outside North America. If non-English speaking participants wish to contact the Chair for ethics concerns, translation assistance may be necessary, as the REB chair communicates in English only.

WITHDRAWAL: In deciding whether I want to participate, I am aware that I am free to decline to answer any question that I find objectionable or which makes me feel uncomfortable. To withdraw from this study, in which case none of my responses or any material related to my participation will be retained, I can simply [close my web browser at no loss of credit]/[skip through the remainder of the study and receive my compensation] or tell the researcher that I wish to leave the session. I understand that once I submit my response, my data can be removed for up to [two weeks after the date of submission] after which point the data will be anonymized and cannot be removed. No explanation for my withdrawal will be necessary. If I am completing this procedure in the laboratory, I should inform the experimenter by the end of the session of this request or email them before the date specified.

VOLUNTARY PARTICIPATION: By continuing this study, I indicate that I have read the Letter of Information and understand the nature of this study. In addition, the experimenter has answered my questions satisfactorily. I know that I may refuse to answer any questions or discontinue my involvement at any time without penalty and/or impact on academic standing. My signature below indicates that I have read the information in this form and consent to participate in this study voluntarily. I have not waived any legal rights by consenting to participate in this study.

By continuing, I am verifying that: I have read the Letter of Information and all of my questions have been answered.

Debriefing

Thank you for participating in today's study. At the beginning of this study, you were informed that today's study was in order to gauge how people feel about legal Cannabis in Canada, or that it was about people's various reactions to art. However, the real purpose of this study was to investigate the differences between high/low actual elaboration versus high/low perceived elaboration.

We believe that by having some participants hold an image in their minds while taking this study, they are less likely to engage in deeper thought than who do not have to think of an image throughout the investigation. We also wanted to test if false feedback on the quiz changed how much people thought they thought about the message about Cannabis and how this affected their responses to various questions about it. As such, the feedback you received today on how you did on the quiz about Cannabis was preset and in no way reflected how you actually did.

The government of Canada may or may not be considering changes to its policy on Cannabis legalization. We are not informed of any special or privileged information regarding this matter. All information presented in this session was constructed by the experimenter for use in this study. Thus, you should be aware that the information communicated to you is not necessarily accurate.

Your participation in this study is greatly appreciated. In the event that you have any complaints, concerns, questions, or would like access to study results, please contact Dr. Leandre Fabrigar (613-533-6492, fabrigar@queensu.ca). Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board
(chair.GREB@queensu.ca or (613) 533-2988 or 1-844-535-2988 (toll-free). You should feel free to raise any issues of interest or concern with the research assistant running the session. If the assistant cannot answer your question, he or she will refer you to Dr. Leandre Fabrigar.

This is an ongoing research project: please do not discuss this project with anyone, as knowledge of what we are trying to find may alter the results we obtain.

Thank you for your participation.

Appendix B (Materials for Study 1)

1) Message Primer for High Elaboration Condition

The following page has some information about Cannabis. Read carefully, as you will be asked to answer additional questions later.

2) Cover story for Low Elaboration Conditions

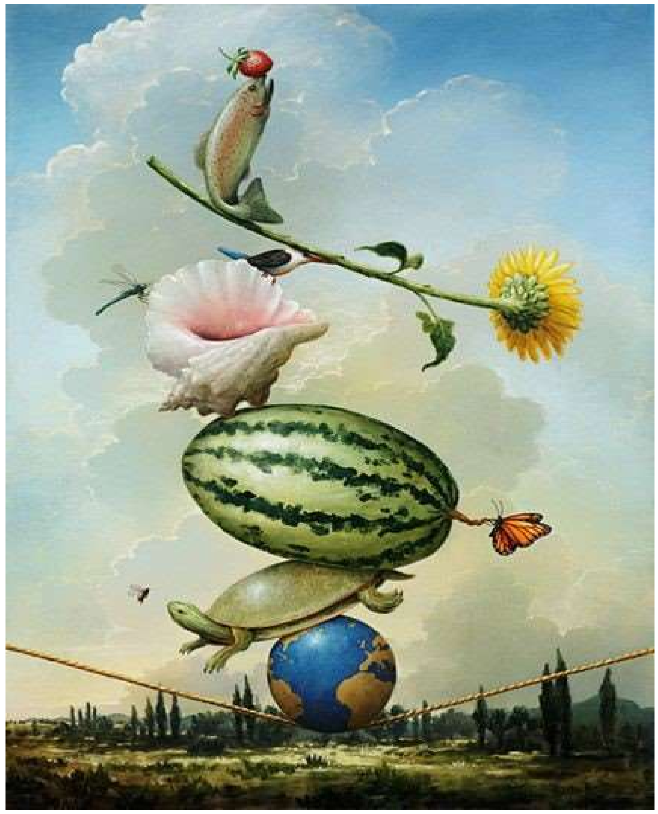
For this study, we are interested in the different ways people react to various forms of media such as art, paintings and murals. When people have instant responses to a particular piece, sometimes this evaluation can change over time and become quite different from the initial reaction. People may remember things they didn't notice at first, reflect on various pieces of the art throughout their day, and may return to it with a newfound appreciation or a different perspective. This often happens after finishing a book or watching a movie as well, so we hope to study this process as it can extend to a wide range of areas.

For this particular study, we will show you a painting that we want you to look at. Study it for as long as you think you need to so that you have a good mental image of it. Some subjects will be asked to give their reactions immediately, while others will be asked about it at the end of the study. You will find out which condition you are in on the next page.

You will be in the delayed condition of this study, meaning you will be shown a painting to analyze and think about for as long as you'd like. When you have a strong impression of the image, please continue the rest of the experiment. Please remember to hold the image in your mind as you progress, as it will not be shown again, and you will be asked questions about it at the end of the study.

In the real world, when people encounter a work of art, they rarely are afforded the opportunity to deeply reflect on it immediately. Rather, they go about their day engaging in a variety of other unrelated cognitive tasks, only to come back to their thoughts about the image later on. To stimulate this, we will show you a painting to study for as long as you'd like, then ask you do an unrelated task. Questions about the image will be asked at the end of the study, and since it will not be shown again, please attend to the painting carefully so you have a clear picture of it in your mind once the task is completed. Also, please consider your potential reactions to the painting, as well as how you feel about it. We will ask questions about this as well.

3) Distraction image for Low Elaboration Conditions



Now that you've seen the painting, we will present an unrelated task about Cannabis. Read carefully, as you will be asked to answer additional questions about this task later on. However, we will also be asking about the painting later as well, so be sure to consider how you feel about the painting and what its significance might be as you read the Cannabis message and answer the questions related to it.

4) Pro-Attitudinal Persuasive Message (Time 1)

Despite the fact that Cannabis has enjoyed a legal status in Canada for the past several years, discussions on the merits of this policy continue. These discussions often leave out some important considerations. For example, people may forget that when it was illegal, black-market Cannabis was frequently laced with other drugs such as fentanyl and PCP, and it is the regulation of Cannabis that prevents it from being adulterated with other substances. This has made it much safer for users who can now buy Cannabis from government-approved dispensaries. Moreover, other regulated substances, such as addictive pain medications like opiates, can often be replaced with Cannabis, which can benefit those who struggle with controlling their pain without potentially leading to dangerous overdoses when too much is taken. Along with these benefits, Cannabis can also reduce anxiety and help people sleep- this has several cognitive benefits such as improving attention and focus throughout the day. Not only this, but Cannabis can also help treat those with serious psychotic disorders such as schizophrenia by calming down their overactive minds to provide psychological relief. Taken together, rather than being harmful, Cannabis is often beneficial, as it provides a variety of health-promoting effects such as those already described and more, such as lowering blood pressure and reducing inflammation.

Outside of general health, there are other benefits to Cannabis legalization as well. For example, when illegal, police officers were required to focus on minor drug offenses when they arose, and this was required even when law-enforcement considered such offenses to be inconsequential. Legalized Cannabis allows law-enforcement to focus on other, more serious crimes, such as theft and assault. In addition to saving money on enforcement, Cannabis can generate tax revenue for local and provincial governments, ultimately helping communities to increase funding in directions that can be used for other public services. If this money did not go to the community, it would support local drug dealers instead. And finally, leaving aside the argument that people should have the freedom to use Cannabis if they are not harming anyone else (and that deciding how citizens can and cannot spend their free time is a violation of personal liberty), the criminalization of Cannabis put many innocent people into jails and prisons. This was a serious harm that was much more damaging than any negative side-effects Marijuana may have. It also disproportionally affected minorities, contributing to institutionalized racism within the justice system as a result of harsh drug laws. All things considered, Cannabis should keep its legal status.

5) Quiz (Manipulation)

In order to test your understanding of the previous arguments, we would like you to answer the following questions regarding the message you read about Cannabis.

1. Illegal Cannabis was often laced with fentanyl and PKP.
   i) True
   ii) False

2. Cannabis was legalized for both medical and recreational use in Canada in...
   i) 2017
   ii) 2019
   iii) 2018
   iv) Not specified

3. Cannabis can help people sleep by
   i) Providing psychological relief
   ii) Calming their overactive minds
   iii) Reducing their anxiety
   iv) It doesn’t help people sleep

4. Pain medications such as opiates can often be safely replaced with Cannabis
   iii) True
   iv) False

5. Possible side effects associated with Cannabis ingestion include:
   v) Improved attention and focus
   vi) Psychotic disorders such as schizophrenia
   vii) Anxiety and depression

viii) Increased blood pressure

6. Cannabis can be legally purchased
   v) From a friend
   vi) At a government-approved dispensary
   vii) At a gas station
   viii) At a local head shop

7. Legalized Cannabis allows law-enforcement to
   ix) Ignore drug related crimes
   x) Relax after a stressful day at work
   xi) Focus on other, more serious crimes
   xii) Generate personal revenue

8. Cannabis has been available to the public for
   ix) Months
   x) Years
   xi) Decades
   xii) None of the above

9. Criminalized Cannabis…
   xiii) Gives people the freedom they deserve
   xiv) Helps citizens spend their time more wisely
   xv) Helps free innocent people from jail
   xvi) Puts many innocent people in jail

10. Which statement about criminalized Cannabis is true?
   xiii) Cannabis is increasing in popularity in Canada
   xiv) Cannabis has not been shown to have any negative side effects
   xv) It contributes to institutionalized racism
   xvi) Cannabis should keep its legal status

Please wait a moment- your score is being computed.

6.) High/Low Perceived Feedback

You correctly answered 8 or more out of 10 questions. This is well above average, indicating that you paid close attention to the message

You correctly answered fewer than 5 out of 10 questions. This is well below average, indicating that you did not pay close attention to the message.

7.) Counter-Attitudinal Persuasive Message (Time 2)

While Cannabis has been legal in Canada since late 2018, discourse surrounding the issue continues. This discussion often neglects many serious and significant considerations. For example, although Cannabis smoke is often seen as safer than Tobacco smoke because users require less of the plant material to reach the desired effects, Cannabis smoke deposits more tar into the lungs than the smoke of Tobacco and is still carcinogenic. Thus, anyone concerned about the health threats of Tobacco smoke should also be concerned about the health threats of Cannabis smoke. There are other negative health effects as well. Since Cannabis affects your body's natural endocannabinoid system, it can interfere with these natural processes and cause long-term cognitive declines in memory, attention and executive functioning. Not only this, but Cannabis has also been linked to increased headaches, irritability, brain fog and depression, which may be why studies have linked to a lack of employee productivity and general declines in motivation. Indeed, partially owing to its lethargic consequences, some experts are even beginning to call Cannabis a type of narcotic drug. And while Cannabis may help treat patients who currently have mental illnesses such as schizophrenia, it can lead to the development of these disorders in patients who do not presently have them by activating the latent genetics that contribute to their expression.

Although these potential negative consequences should be enough to give people pause about the wisdom of legalized Cannabis, Cannabis frequently leads to people using more dangerous and addictive drugs. This "gateway drug" hypothesis has found substantial support in research on substance abuse, as most individuals who use hard drugs either started with Cannabis or use it alongside other substances. And while Cannabis may or may not be physically addictive, it is without question psychologically addictive. Importantly, this is still very harmful, as it can consume people's lives just like other forms of psychological addiction such as serious problem gambling. In short, psychological addiction can be every bit as destructive as physical addiction. Additionally, frequent Cannabis use may very well lead to long-term dependence, a notion supported by the presence of physical and emotional withdraw symptoms upon abrupt cessation.

Alongside these important health concerns, now that Cannabis is legalized and more easily obtained, it is estimated that (and initial data support) that more people will use the drug more frequently and in greater quantities. This is likely to be true both at home and on the road. These rising numbers will inevitably increase the amount of traffic-related accidents and fatalities that result from citizens driving while under the effects of Cannabis. To make matters worse, there is not a standardized diagnostic procedure for law enforcement to determine if one is intoxicated by Cannabis or not, making the enforcement of impaired driving exceedingly difficult. And because of legalization, Cannabis is becoming increasingly popular to people of all ages and demographics, including minors. Not only are minors most at risk for negative effects because their prefrontal cortex is not fully developed, but they are also often unable to understand the potential risks, so young people exposed to legalized Cannabis may be more likely to abuse the drug. After all, Cannabis can be sold to the public, which may be seen as an implicit stamp of approval from society regarding its safety, despite the fact abundant research exists indicating it might be harmful alongside a lack of understanding of its long-term health effects. It is now known that there may be serious consequences to even moderate Cannabis use that will only be discovered years after additional research, calling already questionable current perceptions of safety into serious question. All things considered, the legal status of Cannabis should be carefully re-evaluated.

8.) Measures

PA1

Do you like that Cannabis is legal?

Not at all						Defintely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PA2

Do you dislike that Cannabis is legal?

Not at all						Defintely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PA3

Do you think legal Cannabis is positive?

Not at all						Defintely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PA4

Do you think legal Cannabis is negative?

Not at all						Defintely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PA5

Do you think legal Cannabis is good?

Not at all						Defintely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PA6

Do you think legal Cannabis is bad?

Not at all						Defintely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PA7

Do you think legalized Cannabis is desirable?

Not at all						Defintely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PA8

Do you think legalized Cannabis is undesirable?

Not at all						Defintely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PAC1

How certain are you about your opinion on legal Cannabis?

Not at all						Absolutely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PAC2

How confident are you about your opinion on legal Cannabis?

Not at all						Absolutely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PAC3

How sure are you of your opinion on legal Cannabis?

Not at all						Absolutely
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PBI1

If there were a new ballot vote for or against legal Cannabis, how would you vote?

Very Against						Very in Favor
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PBI2

How willing would you be to sign a petition in favor of legal Cannabis?

Completely Unwilling						Completely Willing
1	2	3	4	5	6	7
○	○	○	○	○	○	○

PBI3

How willing would you be to let us add your name to a list of people in favor of legal Cannabis?

Completely Unwilling						Completely Willing
1	2	3	4	5	6	7
○	○	○	○	○	○	○

APE1

You were asked to read a message and think about the implications. Please answer the following questions about the message using the following scale.

	None	A little	A moderate amount	Somewhat	A lot
How much attention did you give to the message you read?	○	○	○	○	○
How much did you think about the message you read?	○	○	○	○	○
How much effort did you spend thinking about Cannabis?	○	○	○	○	○
How much knowledge do you have about Cannabis?	○	○	○	○	○

CR1

We are interested in what thoughts came to mind **while** you were reading to the passage on the positives of legalized Cannabis. That is, as you read the passage, you probably had positive, neutral, negative, or unrelated reactions and thoughts. Whatever you thought is perfectly fine. We are simply interested in knowing what those thoughts were.

On the following screens, you will find a series of boxes. Simply type what it is that you were thinking **while** you read the message about the positives of legalized Cannabis in the boxes provided. Please put only one thought or idea in each box.

CR2

Only try to record those ideas, reactions, and thoughts that you were thinking **while** you were actually reading to the passage about legal Cannabis. Do not worry about spelling, grammar, or having complete sentences.

Use only as many boxes as you need. If you can remember only four thoughts, use only four boxes. However, you are required to make a response for each box. As such, you may enter the word "none" for the remaining boxes. If you can think of more, use as many boxes as you need. But, you do not have to use every box; only as many as you need. Please begin now.

Thought1

Please enter the thoughts you had while reading the message about legal Cannabis in the boxes provided. Press continue to go to the next box. You are required to enter something in each box given; however, only enter as many thoughts as you desire. If you run out of thoughts you may type "none" until no more boxes are presented.

Thought 1

Page Break

Thought2

Thought 2

Thought3

Thought 3

Page Break

Thought4

Thought 4

Page Break

Thought5

Thought 5

Thought6

Thought 6

Page Break

Thought7

Thought 7

Thought8

Thought 8

Thought9

Thought 9

Page Break

Thought10

Thought 10

AA1

Legalized Cannabis is:

Extremely dislikable 1	2	3	4	5	6	Extremely likable 7
○	○	○	○	○	○	○

AA2

Legalized Cannabis is:

Extremely Negative 1	2	3	4	5	6	Extremely Positive 7
○	○	○	○	○	○	○

AA3

Legalized Cannabis is:

Extremely Bad 1	2	3	4	5	6	Extremely Good 7
○	○	○	○	○	○	○

AA4

Legalized Cannabis is:

Extremely Undesirable 1	2	3	4	5	6	Extremely Desirable 7
○	○	○	○	○	○	○

AAC1

How certain are you of your opinion about legal Cannabis?

Not at all 1	2	3	4	5	6	7	8	Absolutely 9
○	○	○	○	○	○	○	○	○

AAC2

How confident are you of your opinion about legal Cannabis?

Not at all 1	2	3	4	5	6	7	8	Absolutely 9
○	○	○	○	○	○	○	○	○

AAC3

How sure are you of your opinion on legal Cannabis?

Not at all 1	2	3	4	5	6	7	8	Absolutely 9
○	○	○	○	○	○	○	○	○

AB1

If there were a new ballot vote for or against legal Cannabis, how would you vote?

Very Against 1	2	3	4	5	6	7	8	Very In Favor 9
○	○	○	○	○	○	○	○	○

AB2

How willing would you be to sign a petition in favor of legal Cannabis?

Completely Unwilling 1	2	3	4	5	6	7	8	Completely Willing 9
○	○	○	○	○	○	○	○	○

AB3

How willing would you be to let us add your name to a list of people in favor of legal Cannabis?

Completely Unwilling 1	2	3	4	5	6	7	8	Completely Willing 9
○	○	○	○	○	○	○	○	○

NFCInstruct

For each of the following statements, please indicate whether or not the statement is characteristic of you or of what you believe.

N4C1

I prefer complex to simple problems

Extremely uncharacteristic of me				Extremely characteristic of me
1	2	3	4	5
○	○	○	○	○

N4C2

I like to have the responsibility of handling a situation that requires a lot of thinking

Extremely uncharacteristic of me				Extremely characteristic of me
1	2	3	4	5
○	○	○	○	○

N4C3

Thinking is not my idea of fun

Extremely uncharacteristic of me				Extremely characteristic of me
1	2	3	4	5
○	○	○	○	○

N4C4

I would rather do something that requires little thought than something that is sure to challenge my thinking abilities

Extremely uncharacteristic of me				Extremely characteristic of me
1	2	3	4	5
○	○	○	○	○

N4C11

I really enjoy a task that involves coming up with new solutions to problems

Extremely uncharacteristic of me				Extremely characteristic of me
1	2	3	4	5
○	○	○	○	○

N4C15

I would prefer a task that is intellectual, difficult, and important to one that is somewhat but does does not require much thought

Extremely uncharacteristic of me 1	2	3	4	Extremely characteristic of me 5
○	○	○	○	○

Image Questions

Details1

Please describe the image from the beginning of the study you were asked to remember in as much detail as possible. Use as many words and as much time as you need.

Page Break

Details2

What objects were stacked on the rope? Please list each one.

Details3

What was in the background of the image?

Details4

The image may have appeared in your mind throughout the time you conducted the previous tasks. How frequently did this occur?

Not at all 1	2	3	4	5	6	All the time 7
○	○	○	○	○	○	○

Details5

To what degree did you want to think about the image, but were unable because you had to focus on the task?

Not at all						All the time
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Details6

How many living beings were in the image?

2	3	4	5	6
○	○	○	○	○

Page Break

Details7

How did the image make you feel?

Details8

What emotions did the painting invoke in you and to what degree? Sadness? Curiosity?

Details9

What did you think about the meaning of the image?

Details10

How much did you like the image?

Not at all 1	2	3	4	5	6	A great deal 7
○	○	○	○	○	○	○

Details11

Compared to when you first saw it, do you have a different reaction now that you are reflecting on the image?

No	Yes
○	○

Details12

If yes, what was different?

Appendix C (Ethics for Study 2)

CONSENT TO ACT AS A HUMAN RESEARCH SUBJECT: DUST

Leandre Fabrigar, Ph.D.

Department of Psychology, Queen's University

PURPOSE: I have been invited to participate in this research study, titled DUST. I will be asked to complete one or more tasks. I will be asked to read a series of messages and arguments and may be asked to look at some pictures and will be asked various questions about them. The procedure should take no more than 20 minutes for most respondents. Participation is voluntary and I can decline to participate in the research or any aspect of the research at any time without penalty and/or impact on academic standing. I will receive 1.0 extra credits, or $10 if arranged, for my participation in both this study and several other studies that will be included in this session.

RISKS: There are no anticipated risks associated with my participation, but if I feel uncomfortable or distressed, I can reach out to the resources outlined here. Specifically, if I live in Kingston, Ontario I can contact the Telephone Aid Line Kingston (TALK) at 613-544-1771. If I am in Ontario I can text Good2Talk at 686868 or talk to them by calling 1-866-925-5454. If I am outside of Ontario, I can also reach out to EmpowerMe by visiting their website at https://ear.powerflexweb.com/1545/login_SC.html or by phone in North America at 1-844-741-6389.

BENEFITS: I understand that I will not receive any benefit for completing this research study.

CONFIDENTIALITY: Authorized personnel include the researcher mentioned here, as well as the research collaborators working with the principal investigator. Thus, the confidentiality of my information will be maintained now and in the future.

Furthermore, please note that:

The Queen's General Research Ethics Board (GREB) may request access to study data and/or all other study materials used in this research to ensure that we (the research team) have or are meeting our ethical obligations in conducting this research. GREB is bound by confidentiality agreements and will not release any personal information.

RESEARCH DATA: The information I supply will be kept on a password-protected computer and/or in a locked room to which only authorized personnel will have access and will be anonymized once data collection has completed so as to remove any identifying information. All files containing identifying information will be deleted after the data has been fully integrated. You should note that although the data will be anonymized, it is possible that your social media information might include sufficient information for some people to deduce your identity. Thus, should you have concerns about this possibility, you should feel free to delete any identifying information in your social media archives prior to sharing it with the researcher. The final data file will be stored indefinitely and will be released upon request to authorized researchers who may access the anonymous data via the Open Science Framework. However, no identifying information will be provided in the dissemination of any work and that a pseudonym or study ID number will be used in any publications or study records. Any research reports resulting from this study will contain no individual data but will rather focus on grouped findings. Results from this research may be presented in a professional journal, book chapter, or at scientific conferences. It may also be posted to an open science repository such as the Open Science Framework (www.osf.io) to help work towards data transparency in psychology. Should I be interested in the researchers' findings, I will be able to obtain a copy of the results upon request.

IF I HAVE QUESTIONS: Any questions about study participation may be directed to Dr. Leandre Fabrigar, at fabrigar@queensu.ca. If you have any ethics concerns, please contact the General Research Ethics Board (GREB) at 1-844-535- 2988 (Toll free in North America) or email chair. GREB@queensu.ca. Call 1-613-5332988 if outside North America. If non-English speaking participants wish to contact the Chair for ethics concerns, translation assistance may be necessary, as the REB chair communicates in English only.

WITHDRAWAL: In deciding whether I want to participate, I am aware that I am free to decline to answer any question that I find objectionable or which makes me feel uncomfortable. To withdraw from this study, in which case none of my responses or any material related to my participation will be retained, I can simply [close my web browser at no loss of credit]/[skip through the remainder of the study and receive my compensation] or tell the researcher that I wish to leave the session. I understand that once I submit my response, my data can be removed for up to [two weeks after the date of submission] after which point the data will be anonymized and cannot be removed. No explanation for my withdrawal will be necessary. If I am completing this procedure in the laboratory, I should inform the experimenter by the end of the session of this request or email them before the date specified.

VOLUNTARY PARTICIPATION: By continuing this study, I indicate that I have read the Letter of Information and understand the nature of this study. In addition, the experimenter has answered my questions satisfactorily. I know that I may refuse to answer any questions or discontinue my involvement at any time without penalty and/or impact on academic standing. My signature below indicates that I have read the information in this form and consent to participate in this study voluntarily. I have not waived any legal rights by consenting to participate in this study.

By continuing, I am verifying that: I have read the Letter of Information and all of my questions have been answered.

Debriefing

Thank you for participating in today's study. At the beginning of this study, you were informed that today's study was about people's various reactions to art. However, the real purpose of this study was to investigate the differences between high/low actual elaboration versus high/low perceived elaboration.

We believe that by having some participants hold an image in their minds while taking this study, they are less likely to engage in deeper thought than who do not have to think of an image throughout the investigation. We also wanted to test if false feedback on the quiz changed how much people thought they thought about the message about Cannabis and how this affected their responses to various questions about it. As such, the feedback you received today on how you did on the quiz about Cannabis was preset and in no way reflected how you actually did.

The government of Canada may or may not be considering changes to its policy on Cannabis legalization. We are not informed of any special or privileged information regarding this matter. All information presented in this session was constructed by the experimenter for use in this study. Thus, you should be aware that the information communicated to you is not necessarily accurate.

Your participation in this study is greatly appreciated. In the event that you have any complaints, concerns, questions, or would like access to study results, please contact Dr. Leandre Fabrigar (613-533-6492, fabrigar@queensu.ca). Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board
(chair.GREB@queensu.ca or (613) 533-2988 or 1-844-535-2988 (toll-free). You should feel free to raise any issues of interest or concern with the research assistant running the session. If the assistant cannot answer your question, he or she will refer you to Dr. Leandre Fabrigar.

This is an ongoing research project: please do not discuss this project with anyone, as knowledge of what we are trying to find may alter the results we obtain.

Thank you for your participation.

Appendix D (Materials for Study 2)

1) Cover story for Low Elaboration Conditions

For this study, we are interested in the different ways people react to various forms of media such as art, paintings and murals. When people have instant responses to a particular piece, sometimes this evaluation can change over time and become quite different from the initial reaction. People may remember things they didn't notice at first, reflect on various pieces of the art throughout their day, and may return to it with a newfound appreciation or a different perspective. This often happens after finishing a book or watching a movie as well, so we hope to study this process as it can extend to a wide range of areas.

For this particular study, we will show you a painting that we want you to look at. Study it for as long as you think you need to so that you have a good mental image of it. Some subjects will be asked to give their reactions immediately, while others will be asked about it at the end of the study. You will find out which condition you are in on the next page.

You will be in the delayed condition of this study, meaning you will be shown a painting to analyze and think about for as long as you'd like. When you have a strong impression of the image, please continue the rest of the experiment. Please remember to hold the image in your mind as you progress, as it will not be shown again, and you will be asked questions about it at the end of the study.

In the real world, when people encounter a work of art, they rarely are afforded the opportunity to deeply reflect on it immediately. Rather, they go about their day engaging in a variety of other unrelated cognitive tasks, only to come back to their thoughts about the image later on. To stimulate this, we will show you a painting to study for as long as you'd like, then ask you do an unrelated task. Questions about the image will be asked at the end of the study, and since it will not be shown again, please attend to the painting carefully so you have a clear picture of it in your mind once the task is completed. Also, please consider your potential reactions to the painting, as well as how you feel about it. We will ask questions about this as well.

Image is Shown

Now that you've seen the painting, we will present an unrelated task containing a message about legal Cannabis. Read carefully, as you will be asked to answer questions about this message later on. However, we will also be asking about the painting later as well, so be sure to consider how you feel about the painting and what its significance might be as you read the Cannabis message and answer the questions related to it.

2) Cover story for High Elaboration Conditions

For this study, we are interested in the different ways people react to various forms of media such as art, paintings and murals. When people have instant responses to a particular piece, sometimes this evaluation can change over time and become quite different from the initial reaction. People may remember things they didn't notice at first, reflect on various pieces of the art throughout their day, and may return to it with a newfound appreciation or a different perspective. This often happens after finishing a book or watching a movie as well, so we hope to study this process as it can extend to a wide range of areas.

For this particular study, we will show you a painting that we want you to look at. Study it for as long as you think you need to so that you have a good mental image of it. Some subjects will be asked to give their reactions immediately, while others will be asked about it at the end of the study. You will find out which condition you are in on the next page.

You will be in the immediate condition of this study, meaning you will be shown a painting to analyze and think about for as long as you'd like. When you have a strong impression of the image, please continue and you will immediately be asked questions about it.

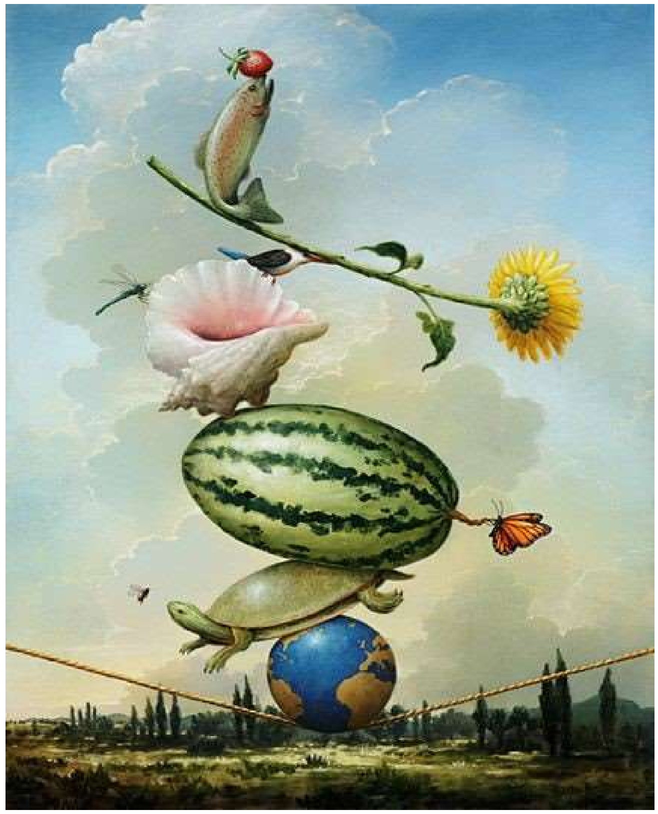
You will now be asked some questions about the image you just saw.

3) Image Questions

- Please describe the image you just saw in as much detail as possible. Use as many words and as much time as you need.
- What objects were stacked on the rope? Please list each one.
- What was in the background of the image?
- How many living beings were in the image?
- How did the image make you feel?
- What emotions did the painting invoke in you and to what degree? Sadness? Curiosity?
- What did you think about the meaning of the image?
- How much did you like the image?

Thank you for answering the questions about the image; this task is now complete and you will not be asked any more questions regarding the image. You will now be asked to read a message about legal Cannabis. Read carefully, as you will be asked to answer questions about this message later on.

4) Distraction Image For All Conditions



5) Pro-Attitudinal Persuasive Message (Time 1)

"Legal Cannabis: A Wise Move in Policy Changes" by Terry Newman, Ph.D. McGill University

Despite the fact that Cannabis has enjoyed a legal status in Canada for the past several years, discussions on the merits of this policy continue. These discussions often leave out some important considerations. For example, people may forget that when it was illegal, black-market Cannabis was frequently laced with other drugs such as fentanyl and PCP, and it is the regulation of Cannabis that prevents it from being adulterated with other substances. This has made it much safer for users who can now buy Cannabis from government-approved dispensaries. Moreover, other regulated substances, such as addictive pain medications like opiates, can often be replaced with Cannabis, which can benefit those who struggle with controlling their pain without potentially leading to dangerous overdoses when too much is taken.

Along with these benefits, Cannabis can also reduce anxiety and help people sleep- this has several cognitive benefits such as improving attention and focus throughout the day. Not only this, but Cannabis can also help treat those with serious psychotic disorders such as schizophrenia by calming down their overactive minds to provide psychological relief. Taken together, rather than being harmful, Cannabis is often beneficial, as it provides a variety of health-promoting effects such as those already described and more, such as lowering blood pressure and reducing inflammation. Outside of general health, there are other benefits to Cannabis legalization as well. For example, when illegal, police officers were required to focus on minor drug offenses when they arose, and this was required even when law-enforcement considered such offenses to be inconsequential. Legalized Cannabis allows law-enforcement to focus on other, more serious crimes, such as theft and assault.

In addition to saving money on enforcement, Cannabis can generate tax revenue for local and provincial governments, ultimately helping communities to increase funding in directions that can be used for other public services. If this money did not go to the community, it would support local drug dealers instead. And finally, leaving aside the argument that people should have the freedom to use Cannabis if they are not harming anyone else (and that deciding how citizens can and cannot spend their free time is a violation of personal liberty), the criminalization of Cannabis put many innocent people into jails and prisons. This was a serious harm that was much more damaging than any negative side-effects Marijuana may have. It also disproportionally affected minorities, contributing to institutionalized racism within the justice system as a result of harsh drug laws. All things considered, Cannabis should keep its legal status.

6) Counter-Attitudinal Persuasive Message (Time 2)

"The Problematic Potential of Legal Cannabis" by Rick Doblen, Ph.D. University of Toronto

While Cannabis has been legal in Canada since late 2018, discourse surrounding the issue continues. This discussion often neglects many serious and significant considerations. For example, although Cannabis smoke is often seen as safer than Tobacco smoke because users require less of the plant material to reach the desired effects, Cannabis smoke deposits more tar into the lungs than the smoke of Tobacco and is still carcinogenic. Thus, anyone concerned about the health threats of Tobacco smoke should also be concerned about the health threats of Cannabis smoke. There are other negative health effects as well. Since Cannabis affects your body's natural endocannabinoid system, it can interfere with these natural processes and cause long-term cognitive declines in memory, attention and executive functioning. Not only this, but Cannabis has also been linked to increased headaches, irritability, brain fog and depression, which may be why studies have linked to a lack of employee productivity and general declines in motivation. Indeed, partially owing to its lethargic consequences, some experts are even beginning to call Cannabis a type of narcotic drug. And while Cannabis may help treat patients who currently have mental illnesses such as schizophrenia, it can lead to the development of these disorders in patients who do not presently have them by activating the latent genetics that contribute to their expression.

Although these potential negative consequences should be enough to give people pause about the wisdom of legalized Cannabis, Cannabis frequently leads to people using more dangerous and addictive drugs. This "gateway drug" hypothesis has found substantial support in research on substance abuse, as most individuals who use hard drugs either started with Cannabis or use it alongside other substances. And while Cannabis may or may not be physically addictive, it is without question psychologically addictive. Importantly, this is still very harmful, as it can consume people's lives just like other forms of psychological addiction such as serious problem gambling. In short, psychological addiction can be every bit as destructive as physical addiction. Additionally, frequent Cannabis use may very well lead to long-term dependence, a notion supported by the presence of physical and emotional withdraw symptoms upon abrupt cessation.

Alongside these important health concerns, now that Cannabis is legalized and more easily obtained, it is estimated that (and initial data support) that more people will use the drug more frequently and in greater quantities. This is likely to be true both at home and on the road. These rising numbers will inevitably increase the amount of traffic-related accidents and fatalities that result from citizens driving while under the effects of Cannabis. To make matters worse, there is not a standardized diagnostic procedure for law enforcement to determine if one is intoxicated by Cannabis or not, making the enforcement of impaired driving exceedingly difficult. And because of legalization, Cannabis is becoming increasingly popular to people of all ages and demographics, including minors. Not only are minors most at risk for negative effects because their prefrontal cortex is not fully developed, but they are also often unable to understand the potential risks, so young people exposed to legalized Cannabis may be more likely to abuse the drug. After all, Cannabis can be sold to the public, which may be seen as an implicit stamp of approval from society regarding its safety, despite the fact abundant research exists indicating it might be harmful alongside a lack of understanding of its long-term health effects. It is now known that there may be serious consequences to even moderate Cannabis use that will only be discovered years after additional research, calling already questionable current perceptions of safety into serious question. All things considered, the legal status of Cannabis should be carefully re-evaluated.

7) Measures

All measures, including the quiz and subsequent false feedback, are the same as Study 1, except for the addition of a second thought listing after the second persuasive message (shown below).

Cog2:1

We are interested in what thoughts came to mind **while** you were reading to the passage on the negatives of legalized Cannabis. That is, as you read the passage, you probably had positive, neutral, negative, thought about Cannabis, or thoughts that were completely unrelated to Cannabis, such as what you're going to have for lunch today. Whatever you thought is perfectly fine. We are simply interested in knowing what those thoughts were.

On the following screens, you will find a series of boxes. Simply type what it is that you were thinking **while** you read the message about the negatives of legalized Cannabis in the boxes provided. Please put only one thought or idea in each box. It's entirely possible that you had fewer thoughts than the boxes we provide: if so, please do not feel obligated to put a thought you did not have and simply skip the question; only write thoughts that occurred to you while you were reading the message about Cannabis.

Cog2:2

Only try to record those ideas, reactions, and thoughts that you were thinking **while** you were actually reading to the passage about legal Cannabis. Do not worry about spelling, grammar, or having complete sentences.

Use only as many boxes as you need. If you had no thoughts, please skip to the end of this section. If you can remember only four thoughts, use only four boxes and skip the ones that remain. If you can think of more, use as many boxes as you need. You do not have to use every box; only as many for the number of thoughts you had while reading the message about Cannabis. Please begin now.

Page Break

2Thought1

Please enter the thoughts you had **while** reading the previous message about the negatives of legal Cannabis in the boxes provided. These thoughts can be related to the Cannabis message, about Cannabis in general, or entirely unrelated to the message.

You do not have to fill out a thought for each box provided; if you run out of thoughts, please skip to the end of this section. You have 30 seconds per thought. Press continue to go to the next box.

Thought 1

2Time1

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

2Thought2

Thought 2

2Time2

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

2Thought3

Thought 3

2Time3

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

Page Break

2Thought4

Thought 4

2Time4

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

2Thought5

Thought 5

2Time5

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

Page Break

2Thought6

Thought 6

2Time6

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

2Thought7

Thought 7

2Time7

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

2Thought8

Thought 8

2Time8

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

2Thought9

Thought 9

2Time9

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

Page Break

2Thought10

Thought 10

2Time10

This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

Appendix E (Materials for Pretest)

In the pretest, participants rated their attitudes towards the topics of legal Cannabis, veganism, and donating their body to science as negative or positive on two unipolar 7-point rating scales ranging from *Not at all* to *Definitely*. After rating their attitudes towards a given topic, participants were then presented individual arguments towards that issue from a randomized set of approximately 15 supportive and 15 unsupportive arguments. To ensure pro-attitudinal and counter-attitudinal arguments are appropriately designated, participants were asked how much they thought each argument was supportive of the given topic on a 7-point bipolar scale ranging from *Very Unsupportive* to *Very Supportive*. To ensure each argument was sufficiently persuasive, participants were also asked how much they thought each argument was convincing on a 7-point bipolar scale ranging from *Very Unconvincing* to *Very Convincing*. Attitudes corresponded as follows: legal Cannabis (M=4.91, SD=1.70), veganism (M=4.78, SD=1.51), and donating body to science (M=5.76, SD=1.18). Legal Cannabis was chosen because of its high mean, indicating positive attitudes. After legal Cannabis was chosen, ratings on the supportiveness measure were used to separate the arguments into their pro- and counter-attitudinal counterparts, while ratings on the convincingness measure were used to drop the least persuasive arguments from the larger integrated message.

Pro-Cannabis Arguments

1. We all encounter small amounts of dangerous chemicals every day, such as the cyanide present in apples. The risk incurred in consuming the natural herb Cannabis isn't more than the risk involved in consuming other chemicals that one encounters on a daily basis.

2. Replacing addictive pain medication with Cannabis benefits those who struggle with controlling their pain. Additionally, many traditional pain medications, such as opiates, can lead to dangerous overdoses when too much is taken, a problem Cannabis does not have.
3. So far there have been no reports of widespread complaints about Cannabis, so there isn't enough evidence to argue that a plant like Cannabis should be banned. If Cannabis was indeed dangerous, we surely would have heard about it from the public by now.
4. Police officers are required to focus on minor drug offenses when they come up, even if they consider such offenses to be inconsequential. Legalized Cannabis allows law-enforcement to focus on other, more serious crimes.
5. People should have the freedom to use Cannabis if they are not harming anyone else. Deciding how citizens can and cannot spend their free time is a violation of personal liberty.
6. Cannabis is a good source of tax revenue for local and provincial governments. If it didn’t go to supporting the community, it would support local drug dealers instead.
7. Black market cannabis is often laced with drugs such as fentanyl and PCP. The regulation of Cannabis helps prevent it from being adulterated with other drugs and encourages safety.
8. Cannabis is not harmful, rather, it is beneficial and provides a variety of health-promoting effects, such as lowering blood pressure and reducing inflammation.
9. Cannabis is not physically addictive, and can even help manage the withdraw that comes with the sudden cessation of other drugs like alcohol.
10. Cannabis helps treat those with serious psychotic disorders such as schizophrenia by calming down their overactive minds to provide psychological relief.
11. Cannabis reduces anxiety and helps people sleep, which has several cognitive benefits such as improving attention and focus throughout the day.

12. Many people who consume alcohol only do so because it is a legal drug. If they replace their drinking with legal cannabis, this may reduce the amount of overall alcohol use and drunk driving.
13. The legalization of Cannabis helps reduce the impact and power of gangs and cartels. These organizations rely on the sale of illegal drugs for revenue, so legalization creates significant competition and reduces the scope of the black market.
14. The use of Cannabis does not lead to engagement in criminal activity in a legal environment, it is only when it is illegal that it is associated with crime because one has to contact those who are willing to break the law to acquire it.
15. Smoking Cannabis is safer than smoking tobacco because you need much less of it to reap the benefits. Thus, Cannabis can replace cigarettes for tobacco users to improve their health.
16. Legalized Marijuana lowers the prices of Cannabis because it encourages more production, making it more affordable for those who need it.
17. Cannabis can be processed into paper, which saves many trees and helps save our environment. Additionally, Cannabis can also be used to produce shirts in a manner much more eco-friendly than cotton.
18. The criminalization of Cannabis use puts many innocent people into jails and prisons, which harms them much more than any negative side-effects Marijuana may have. This also disproportionately affects minorities, contributing to institutionalized racism within the justice system as a result of harsh drug laws.

Table 4: Pro-Cannabis Argument Descriptives

Argument	Supportive Mean	Supportive SD	Convincing Mean	Convincing SD
1	5.24	1.6	3.45	1.64
2	5.74	1.11	5	1.58
3	4.79	1.47	2.88	1.49
4	5.21	1.43	4.3	1.59
5	5.94	1.7	4.41	1.4
6	5.24	1.5	4.32	1.57
7	6.12	1.25	6.01	1.99
8	5.65	1.67	4.35	1.5
9	5.15	1.05	4.18	1.31
10	5.91	0.9	4.68	1.43
11	5.79	1.32	4.88	1.57
12	4.65	1.65	3.15	1.64
13	5.32	1.72	4.24	1.58
14	5.58	1.17	4.15	1.33
15	5.24	1.6	3.45	1.64
16	5.21	1.47	4	1.58
17	5.18	1.72	3.97	1.69
18	4.97	2.1	5.38	1.58

Anti-Cannabis Arguments

1. Cannabis can be sold to the public despite research indicating it might be harmful and a lack of understanding on its long-term health effects. There may be serious consequences to heavy cannabis use that we will only find out after years of additional research, calling current perceptions of safety into question.
2. The narcotic drug Cannabis has been linked to increased headaches, irritability, brain fog and depression. This may be why Cannabis has been linked to a lack of productivity and general laziness.
3. Because of legalization, Cannabis is becoming increasingly popular to people of all ages and demographics, including minors. Because they are often unable to understand the potential risks, young people exposed to legalized cannabis may be more likely to abuse the drug.

4. With legalized Cannabis, more people will use the drug both at home and on the road, which increases the number of traffic-related accidents and fatalities from individuals who drive under its effects. Also, there is not a standardized way for law enforcement to determine if one is under the effects of Cannabis or not, making the enforcement of impaired driving difficult.
5. Cannabis leads to people using more dangerous and addictive drugs. This "gateway drug" hypothesis has found substantial support in research on substance abuse, as most individuals who use hard drugs either started or also use cannabis.
6. Legalized Cannabis is seen as a stamp of government approval and encourage more people to use it. People may ask, "if it's so bad, why can I buy it at a local store?"
7. The use of drugs is immoral because it negatively impacts not only yourself but others around you, such as family and friends; Cannabis is no exception. You may lose interest in attending to your loved ones and become a financial burden on others to afford more of the drug.
8. Cannabis makes people lazy because the euphoria it provides reduces motivation to seek pleasure through work and other productive means, which has a negative impact on society. It has also been linked to depression, which can further promote lethargy.
9. While it may not be physically addictive, Cannabis is psychologically addictive. This is still harmful as it can consume your life just like other forms of psychological addiction such as gambling or video games.
10. While Cannabis may help treat patients who currently have mental illnesses such as schizophrenia, it can lead to the development of these disorders in patients who do not presently have them.

11. Because Cannabis affects your body's natural endocannabinoid system, it can interfere with these natural processes and cause long-term cognitive declines in memory, attention and executive functioning.
12. The use of Cannabis often leads people to engage in criminal activity, as its psychologically addictive nature can motivate theft and burglary to acquire more of the drug.
13. Although Cannabis smoke is often seen as safer than Tobacco smoke because users require less of the plant material to reach the desired effects, Cannabis smoke deposits more tar into the lungs than tobacco smoke and is still carcinogenic.

Table 5: Anti-Cannabis Argument Descriptives

Argument	Supportive Mean	Supportive SD	Convincing Mean	Convincing SD
1	3.15	1.76	4.71	1.22
2	2.27	1.59	4.36	1.54
3	2.71	1.93	4.88	1.6
4	2.47	1.6	4.85	1.64
5	2.21	1.59	4.71	1.51
6	3.18	1.55	3.73	1.78
7	1.73	1.28	4.27	1.81
8	2.09	1.16	4.18	1.59
9	2.47	1.42	4.41	1.56
10	2.59	1.6	4.41	1.58
11	2.29	1.43	5.15	1.08
12	2.09	1.53	3.88	1.65
13	2.62	1.46	4.74	1.48

Appendix F (Supplementary Analyses)

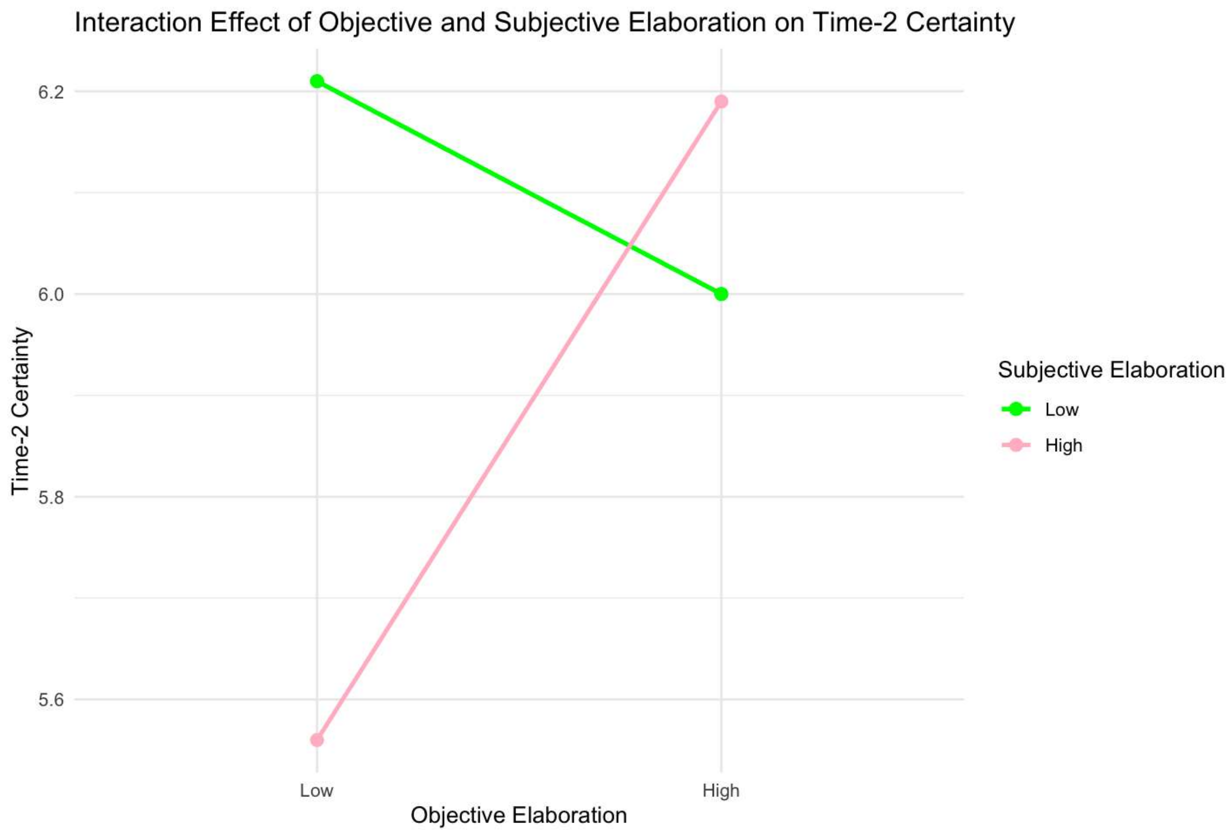
Time 1 Certainty (Study 1). A one-way ANOVA with condition as the independent variable and Time 1 certainty as the dependent revealed no significant differences in certainty between conditions, $F(2, 177)=0.08$, $p=.922$.

Time 2 Certainty (Study 1). An ANCOVA with condition as the independent variable, Time 2 certainty as the dependent variable, and Time 1 certainty as the covariate revealed a significant effect of the covariate, $F(1, 175)=120.78$, $p<.001$, indicating that Time 1 certainty strongly predicted Time 2 certainty. However, there was no significant effect of condition, $F(2, 175)=0.47$, $p=.623$, indicating no significant differences in Time 2 certainty between conditions after controlling for Time 1 certainty.

Time 1 Certainty (Study 2). A 2x2 ANOVA with objective elaboration and subjective elaboration as the independent variables and Time 1 certainty as the dependent variable revealed no significant main effects of objective elaboration, $F(1, 169)=0.01$, $p=.913$, or subjective elaboration, $F(1, 169)=0.87$, $p=.354$, and no significant interaction, $F(1, 169)=0.23$, $p=.635$.

Time 2 Certainty (Study 2). A 2x2 ANCOVA with objective elaboration and subjective elaboration as the independent variables, Time 2 certainty as the dependent variable, and Time 1 certainty as the covariate revealed a significant effect of the covariate, $F(1, 166)=237.74$, $p<.001$, indicating that Time 1 certainty strongly predicted Time 2 certainty. There was no significant main effect of objective elaboration, $F(1, 166)=1.12$, $p=.269$ no significant main effect of subjective elaboration, $F(1, 166)=1.50$, $p=.222$. However, there was a significant interaction effect, $F(1, 166)=5.19$, $p=.024$. This interaction is presented visually in Figure 2 below, showing that although certainty levels are generally similar across conditions, participants in the low objective-high subjective condition report significantly lower certainty.

Figure 2

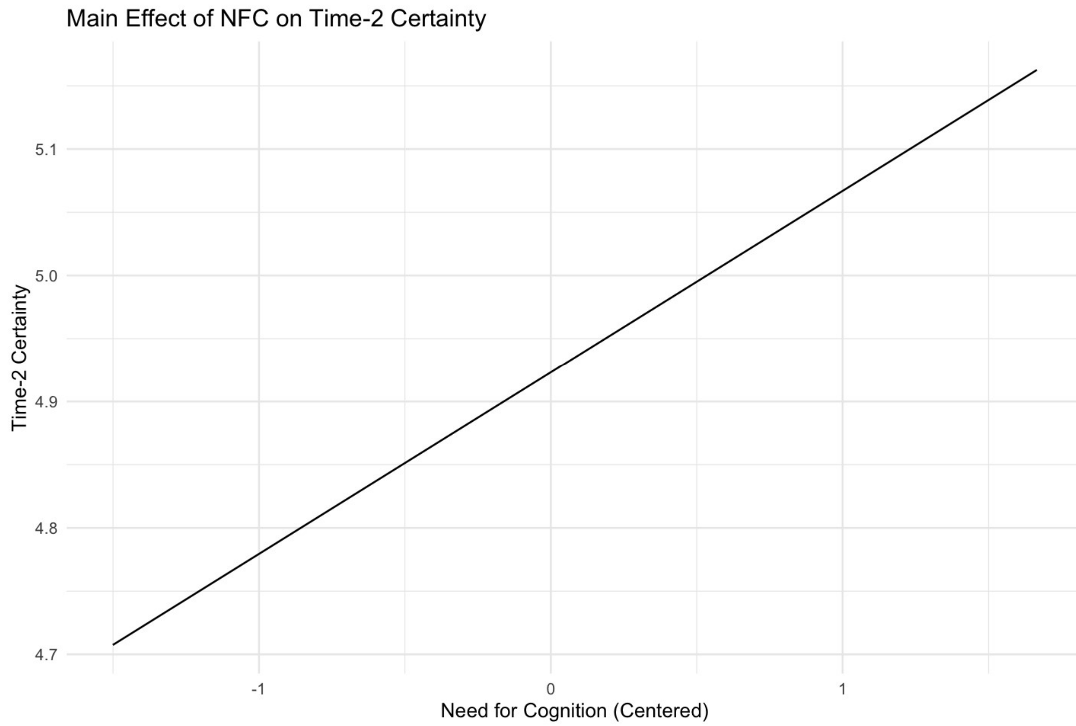


Time 1 NFC Regression Analysis (Study 2). On account of the uncertainty regarding the manipulation of objective elaboration, a regression analysis was conducted to examine the interaction between NFC and subjective elaboration on Time 1 attitudes, intentions, and certainty. For certainty, no significant effects were observed. However, for attitudes, the interaction between NFC and subjective elaboration approached significance, $F(1,167)=3.25$, $p=.073$. Follow-up analyses revealed that under low subjective elaboration, participants with high NFC reported more positive attitudes ($M=5.62$, $SE=0.206$) compared to participants with low NFC ($M=5.00$, $SE=0.162$). For intentions, there was a significant interaction between NFC and subjective elaboration, $F(1,167)=8.33$, $p=.004$. Follow-up analyses indicated that under low

subjective elaboration, high NFC participants exhibited stronger intentions (*M*=5.22, *SE*=0.258) compared to low NFC participants (*M*=4.29, *SE*=0.204). These results are somewhat consistent with expectations, as those who were high in need for cognition (a proxy for high objective elaboration) were less persuaded than those lower in need for cognition (a proxy for low objective elaboration). However, this effect was expected to be more pronounced at high levels of subjective elaboration; instead, it only emerges at low levels of subjective elaboration.

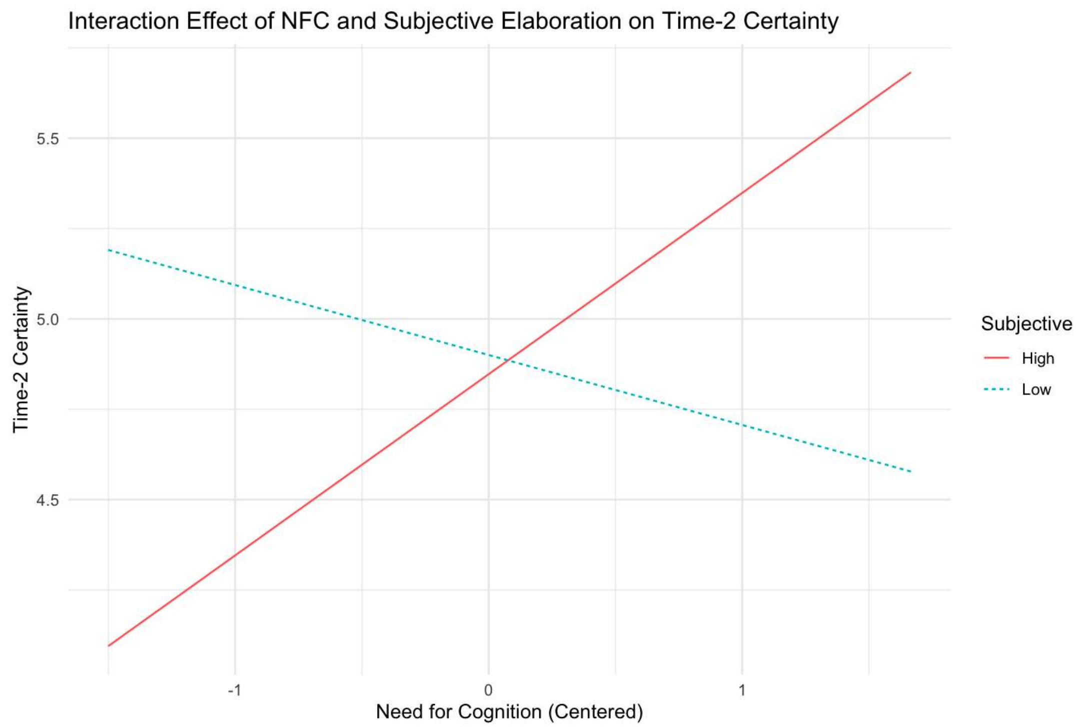
Time 2 NFC Regression Analysis (Study 2). Following the same logic of the Time 1 NFC Regression Analysis, Need for Cognition (NFC) was substituted in its place by using a regression analysis for three Time 2 outcome measures: attitudes, certainty, and intentions, controlling for relevant Time 1 measures. For attitudes and intentions, there were no significant main effects or interactions involving NFC or subjective elaboration. However, for certainty, regression analysis revealed a significant main effect of NFC, $F(1,166)=5.34$, $p=.022$, indicating that higher NFC was associated with greater certainty (depicted below in Figure 3).

Figure 3



Additionally, there was a significant interaction between NFC and subjective elaboration, $F(1,166)=4.99$, $p=.027$. Follow-up simple slopes analysis demonstrated that in the high subjective elaboration condition, higher NFC significantly predicted greater certainty, $b=0.83$, $SE=0.29$, $t=2.86$, $p=.005$. In contrast, in the low subjective elaboration condition, NFC did not significantly predict certainty, $b=-0.17$, $SE=0.33$, $t=-0.52$, $p=.604$. This interaction is depicted below in Figure 4.

Figure 4



Factor Analysis of the 8-Item Attitude Measure. In order to determine if the attitude scale's structure contributed to the lack of finding my hypothesized effects, I conducted an exploratory factor analysis (EFA). Treating the scale as a unidimensional construct could obscure meaningful effects if it is truly multidimensional, making it reasonable to assess its factor structure to help determine if collapsing the items into a single composite score potentially distorted any findings. I used maximum likelihood (ML) estimation to perform this factor analysis in R with the psych package on the reduced correlation matrix—both eigenvalue-based methods and model fit indices were used to help me determine the appropriate number of factors. In terms of the eigenvalues, a scree plot revealed a sharp drop after the first eigenvalue, which suggests a 1-factor solution. Furthermore, parallel analysis confirmed that only the first eigenvalue exceeded the threshold for random data, which also favors a 1-factor solution.

However, model fit indices were calculated for both 1- and 2-factor solutions with oblique rotation (direct oblimin): for the 1-factor solution, the Tucker-Lewis Index (TLI)=0.927 (indicating marginal fit), and the Root Mean Square Error of Approximation (RMSEA)=0.129 (indicating poor fit). For the 2-factor solution, the TLI=1.054 (good fit, but potentially indicative of overfitting), while the RMSEA=0.062 (indicating acceptable fit). Although the 2-factor solution shows improved model fit over the 1-factor solution on part of the model fit indices, and mismatch with the eigenvalue-based methods calls for caution in adopting this solution. Theoretically speaking, a 2-factor solution could suggest that items may reflect the positive and negative subdimensions of the attitudes scale, but the high correlation between these factors (r=0.78) would still support a hierarchical structure nested within a single, superordinate factor. Closer inspection of the rotated 2-factor solution revealed that each of the positive items (PA1, PA3, PA5, PA7) loaded strongly onto the first factor, indicating that this factor well-represents a dimension of positive attitudes. The second factor, however, was almost entirely defined by a single negative item (PA2), with the remaining negative items (PA4, PA6, PA8) weakly loading onto both of the separate factors, indicating substantial cross-loadings. This relatively weak and inconsistent loading pattern can be taken to suggest that the negative items did not form an entirely distinct factor, and rather indicates that most items aligned with the positive factor. To further explore the impact of the problematic item (PA2), I reran the Time 2 attitudes ANCOVA after removing PA2 from the composite score, with results being almost identical to the original analysis, indicating that the inclusion of PA2 did not meaningfully impact the findings. Overall, eigenvalue-based methods and theoretical considerations support treating the attitudes scale as a single construct; however, the model fit indices and presence of correlated subdimensions (e.g., positive and negative attitudes) demonstrates the potential for a hierarchical structure. Based on the unchanged nature of the updated analysis and the strong correlation between the two factors, the use of the full scale as a single composite score is likely unproblematic.

Factor Analysis of the 10-Item Quiz Score Measure. To determine if the quiz score measure's structure contributed to the lack of finding my hypothesized effects, I conducted an exploratory factor analysis (EFA). As previously, treating the scale as a unidimensional construct could obscure meaningful effects if it is truly multidimensional, making it reasonable to assess its factor structure. I used maximum likelihood (ML) estimation to perform this factor analysis in R with the psych package with the reduced correlation matrix—both eigenvalue-based methods and model fit indices were used to help me determine the appropriate number of factors. In terms of the eigenvalues, a scree plot revealed a sharp drop after the second eigenvalue, which suggests a 2-factor solution. Furthermore, parallel analysis confirmed that only the first two eigenvalue exceeded the threshold for random data, which also supports a 2-factor solution. Model fit indices were calculated for a 1- , 2-, and 3-factor solution—oblique (direct oblimin) rotation was initially applied to allow for factors to correlate with one another. However, the factors ultimately showed a negligible correlation ($r=0.084$), suggesting they were essentially uncorrelated. For the 1-factor solution, the TLI=0.938 (marginal fit), and the RMSEA=0.021 (excellent fit). For the 2-factor solution, the TLI=1.196 (good, but potentially overfit), while the RMSEA=0.000 (overfit). For the 3-factor solution, the TLI=1.249 (good, but potentially overfit), and the RMSEA=0.000 (overfit). Thus, based on model fit, only the 1-factor solution is sensible. In addition, a 2-factor solution may be due to artifacts introduced by the dichotomous nature of the data—particularly, difficulty factors, which emerge when items have variable levels of difficulty to participants or distinct endorsement thresholds for other reasons. Further inspection of the 2-factor solution revealed that three items (Q7, Q9, Q10) loaded most strongly onto the first factor, while only one item (Q6) loaded strongly onto the second factor. This pattern suggest that the first factor may be taken to reflect items that were easier or more consistently answered correctly, whereas the second factor appears to capture variance unique to a single item that is more difficult or responded to in a different way compared to the others. In addition, most other items exhibited weak or inconsistent loadings across both of the two factors, demonstrating an absence of a clear and meaningful factor structure. In order to evaluate if this factor structure influenced the manipulation check of objective elaboration based on the quiz scores, I created a new composite score from the quiz items using only the three items that most strongly loaded onto the first factor (Q7, Q9, and Q10) and reran the analysis. The results were consistent with the original full-scale analysis, indicative that using the full quiz or only a subset of the items from the first factor did does not meaningfully impact the results. Overall, it appears that this measure is not particularly amenable to factor analysis. If a 2-factor solution was accepted, the factors would appear to be based on difficulty to participants (e.g., easy and hard items) or some type of response pattern (e.g., agreeable vs nonagreeable items) rather than a meaningful theoretical construct, as the items themselves to not appear conceptually distinct. This suggests that treating the measure as unidimensional is not necessarily invalid, but the potential multidimensionality warrants caution when interpreting the total quiz score due to the poor factor structure.