Science-Informed Practice in Canadian Professional Psychology: Factors Associated with Clinicians' Scientific Skills and Attitudes

by

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Abstract

Foundational to professional psychology, the scientist-practitioner model encourages a scientific approach to practice, strengthening clinical work with the best available research evidence. However, troubling research shows inadequate training in research and science, and low engagement with science-based practice among psychologists. Considering the myriad ways that unscientific practice can worsen outcomes for clients, the extent to which psychologists are scientifically literate and research-informed impacts responsible client care. Despite the rationale and codified ethical imperatives for science-informed practice, there appears to be little research on this topic among Canadian psychologists. The present research reviews the rationale for and components of science-informed practice and presents a self-developed survey instrument for measuring critical thinking skills, science-informed practice attitudes, and clinician demographics. Three hundred and thirty-one psychologists and counsellors from across Canada completed the survey. Training level, training type, and licensure type were associated with science-informed practice attitudes and critical thinking scores. Being a psychologist, being trained in clinical psychology, and having a doctorate all predicted higher critical thinking and attitude scores. Scientific attitude was the strongest predictor of critical thinking, followed by licensure type (i.e., psychologist or counsellor). Item-level results indicated various strengths and weaknesses in Canadian clinicians' endorsements of science-informed practice attitude and embodiment of science-informed practice skills and knowledge. Professional identity among counsellors and psychologists may be less clear than often posited and may contain tensions that work against a robust scientific foundation. Results from this research have implications for clients, clinicians, training programs, regulatory bodies, and the public at large. This research calls for stronger ongoing research to assess the scientific literacy of Canadian clinicians.

Moreover, this research encourages improvement in the robustness of training and regulatory mechanisms for producing science-informed professionals.

Keywords: science-informed practice, scientific competency, critical thinking skills, counselling psychology, psychologist regulation, psychologist education

Preface

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction and Literature Review

Many professional psychologists, including counselling psychologists, have claimed a scientific foundation and identity for most, if not all, of the profession's existence (Vespia & Sauer, 2006). More broadly, science has consistently enhanced quality of life, including improved health treatments, thereby adding to the rationale for science-informed professional psychology (Baker et al., 2008). To be informed by science means to use scientific skills, knowledge, attitudes, and behaviours across the spectrum of practice to enhance credibility, safety, and effectiveness.

The place of science in practice has also been hotly debated for many decades (Baker et al., 2008; Lilienfeld & Basterfield, 2020). At times epistemological, pragmatic, or identity-based, clinicians have demonstrated various levels of support for or resistance to science-informed practice (SIP) and its iterations, including the scientist-practitioner model and evidence-based practice. Although some American research causes concern regarding the integration of science into practice (see Lilienfeld et al., 2013), little is known about the Canadian context. Considering the licensure and training of psychologists unique to Canada, research into SIP in the Canadian context is highly indicated. Doubly unfortunate is the relative lack of measurement tools for SIP specific to professional psychology, particularly in the realm of critical thinking skills.

This research included the development of a survey instrument to assess clinician critical thinking skills, scientific knowledge, and SIP attitudes. Using this developed survey instrument, this research aimed to measure and shed light on SIP in the Canadian professional psychology context.

A Brief History of Applied Psychology

Applied psychology emerged in Europe and America as a more formal discipline in the

late 1800s when psychologists began to use the discoveries and teachings of psychological science to address various real-world problems (Cautin & Baker, 2014). It was Lightner Witmer (1867–1956) who in the early 1900s formalized the field, calling it "clinical psychology." Early applications heavily focused on educational testing and programming, and the remediation of learning difficulties and other issues. Vocational applications were also popular, with Frank Parsons (1854–1908) effectively founding the applied sub-field known as "guidance and counselling." These developments marked the shift from a predominantly experimental field of psychology to a growing clinical field, with increasing numbers of applied psychologists by the 1920s and 30s (Cautin & Baker, 2014).

Both World Wars saw an increased demand for applied psychologists, and by mid-century, the American Psychological Association (APA) was finally ready to concern itself with more than just academic and experimental pursuits, moving to standardize professional psychology. At the time, the larger umbrella of applied psychology included clinical psychology, counselling psychology, and other specializations. Although these fields share significant history, counselling psychology grew directly out of the guidance and counselling movement (Cautin & Baker, 2014).

On the Existence of Counselling Psychology

Dating back to the 1950s, counselling psychology has always been distinguished from clinical psychology based on its wellness and strengths focus rather than a clinical pathology perspective (Goodyear et al., 2016). Coming out of a 1951 conference aimed at clarifying counselling psychology's purview and its orientation to training and standardization, the conference report confirmed that a counselling psychologist's focus was to "foster the psychological development of the individual" (APA, Committee on Counselor Training, 1952, p.

181). This report also determined that counselling psychologists worked predominantly with "individuals within the normal range" (p. 181), and only to some degree with less well-adjusted clientele (as is the predominant focus in clinical psychology).

Despite these (and other) differences, counselling psychology has been plagued with some degree of identity crisis since its beginning (Cautin & Baker, 2014; Vespia & Sauer, 2006). In fact, in the late 1950s, two committees were formed to determine if counselling psychology was a legitimately distinct profession or if it should merely be absorbed under the clinical psychology label (Munley et al., 2004). The first committee was highly critical of the vagueness of the term "counselling" and the paucity of research emphasis in the field (Cautin & Baker, 2014). Although their report suggested that counselling psychology be fused with clinical psychology, Munley et al. (2004) explained that this perspective was significantly a territorial battle, with clinical psychology as the more established player. The second committee determined that counselling psychology was sufficiently unique from clinical psychology, with some complications. To clarify counselling psychology's identity and direction, another conference was held in 1964 out of which came 32 recommendations and an ultimate affirmation of the primary roles of counselling psychologists, including "the remedial/rehabilitative, the preventative, and the educational/developmental" (Baker, 2003, p. 365).

Efforts to distinguish counselling psychology continue, with the most recent survey of counselling psychologists across 10 countries reinforcing a differentiated identity and a unique perspective on mental health and treatment (Goodyear et al., 2016). That study found the most highly rated professional value across the countries was a strengths-focus. Other highly rated values included focusing on diversity and sociocultural context, person-environment interactions, and taking a developmental lens. Values rated in the medium range included having a social

justice focus, using research to inform practice, and providing treatment of variable length (both brief and longer term). This array of features is advanced repeatedly as distinguishing counselling psychology from related professions (e.g., Friesen, 1983; Haverkamp et al., 2011; Munley et al., 2004). However, a remaining complication lies in the diversity between countries where "local" histories and contexts variably influence counselling psychology's standardization, focus, and identity (Beatch et al., 2009).

Counselling Psychology Identity in Canada

Despite its roots in American guidance and counselling, counselling psychology (CP) in Canada is alleged to be dissimilar to its American counterpart. That dissimilarity is particularly due to differing primary training faculties in each country, provincial/territorial diversity (in licensure, definition, language, and culture), as well as the diverse multicultural histories and contexts of each nation (Bedi et al., 2012; Hiebert & Uhlemann, 1993; Young & Lalande, 2011). As a matter of formalizing the discipline, Canadian psychologists made various attempts to understand and define CP in this specific realm, to essentially fortify its boundaries. In so doing, CP is defined by how it can be distinguished from related professions.

While disciplines do not arise simply, clearly, or all at once, there are notable moments in the development of CP in Canada. Friesen (1983) measured CP against common criteria for establishing that a discipline exists, finding that CP fulfilled most of these criteria (having, among other characteristics, a distinct subject matter, a sufficient foundation of theory and research, and widespread utility). In 1986, a Counselling Psychology section of the Canadian Psychological Association (CPA) was created. As a result of this first formal national representation, many significant initiatives followed, including CPA accreditation of CP doctoral programs (Sinacore, 2015). Perhaps most significantly, a committee was formed in 2007 by the

CPA Counselling Psychology Section to investigate CP in Canada (and abroad) and to formalize a CP definition (Beatch et al., 2009). This small but diverse seven-person committee reviewed various documentation and collected feedback, after which a definition of CP was proposed and accepted by the CPA in late 2009. While citing no simple consensus, CP was differentiated from the related fields of clinical psychology and professional mental health counselling (counselling) particularly by its central components of positive psychology and diversity promotion (Sinacore, 2015). In fact, Beatch et al. (2009) determined a wide variety of differences between these three fields. For example, CP research, often qualitative, emphasizes diversity, positive psychology, developmental and career matters, and the counselling process itself, while clinical psychology research has a greater focus on psychopathology, diagnosis, and treatment. CP training is thought to emphasize context, person-environment interactions, a focus on engendering wellness in "normal" populations, and career matters, again with clinical psychology focusing more on medical model matters (e.g., psychopathology, diagnosis/assessment, personality, and cognitive psychology). CP also incorporates diversity at the multicultural and group level, while clinical psychology is alleged to see diversity at the individual level.

In differentiating CP from counselling, Beatch et al. (2009) suggested that CP involves training in psychology, research, and the "application of psychological knowledge" (p. 70), whereas counselling training focuses predominantly on theories of counselling and pragmatic skills without a consistent focus on research competencies or science. In some sense, CP is placed somewhere between the worlds of counselling and clinical psychology. It has a "softer" scientific view than clinical psychology with its often-described hard-nosed medical model, but a *more* science-based lens than counselling with its focus on the counselling process and alleged relative non-reliance on psychological principles and basic science (e.g., biology,

neurochemistry).

Through these efforts, counselling psychology has laid claim to a unique professional purview, with important foundational worldviews and influences. In essence, in the Canadian context counselling psychology has been found to (a) exist as a discipline, and to (b) conceive of itself as having a unique identity different from its closest relatives.[1]

Science as Foundational

Part of the CP identity, as described by Beatch et al. (2009) and others (e.g., Bieschke et al., 2004; Vespia & Sauer, 2006), is the distinction of CP as a science-based profession. While CP distinguishes itself from clinical psychology more by way of its wellness, strengths, and diversity lenses (since both fields claim a scientific foundation), CP distinguishes itself from the less regulated profession of counselling by its insistence on foundational psychological principles and upon science in general (Bedi et al., 2011; Hiebert & Uhlemann, 1993; Sinacore, 2015). Indeed, the foundation of science in CP was articulated and formally adopted 70 years ago and reaffirmed ever since (Vespia & Sauer, 2006).

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[1] However, enough overlap exists both with the American profession and with other related professions that relevant literature from clinical psychology, from counselling, and from other countries across these three professions will be considered here. When the literature poses a glaring or important difference to the Canadian context or to the specific profession, this will be noted. Otherwise, throughout this review, literature from professional psychology (mostly the three mentioned) will often be incorporated, and the professions will sometimes be referred to simply as “professional psychology” or “applied psychology.” In reality, these various professions share history and literature, and no simple delineation exists.

After a half century of developing their methods and reputation and with increasing demand to treat veterans returning from World War II, in 1940s America the profession of applied psychology was growing rapidly. Alongside this growth, many psychologists were concerned (as they had been for decades) about the lack of standardized training programs and thus standardized practice (Cautin & Baker, 2014). Chief among them was David Shakow (1901–1981), a psychologist who had spent the better part of the 1940s developing a training model, chairing committees, and spearheading many initiatives to standardize training (Baker & Benjamin, 2000). Shakow's work grounded training in what were thought to be the core competencies of clinical psychology practice: diagnosis, therapy, and research. In many ways, the culmination of his work was the ground-breaking 1949 Boulder conference where 73 individuals, mostly psychologists (one of them Canadian), met to discuss graduate training for psychologists. Seventy resolutions were accepted and the "scientist-practitioner" model (or "Boulder" model) was adopted (Cautin & Baker, 2014).

This model clarified the imperative for doctoral studies to include both practical and research training (Cautin & Baker, 2014), with both forms of training containing various relevant components (Baker & Benjamin, 2000). In terms of research training, the conference report indicated the need to generate knowledge at multiple levels, including human behaviour, diagnostic procedures, treatment, prevention, and general well-being. It was hoped that in pursuing knowledge generation, clinical psychology would endeavour toward best practices, efficiency, validity, reliability, and a fundamental knowledge base for practice and society (Baker & Benjamin, 2000). In the "Shakow Report" that served as foundational to the Boulder conference and the scientist-practitioner (SP) model, the committee clarified that research training would culminate in a mindset "constantly to ask 'how' and 'why' and 'what is the

evidence' about problems with which [the psychologist] is faced" (APA Committee on Training in Clinical Psychology, 1947, p. 545).

In essence, science and research were conceived of as not only foundationally important to clinical psychology's basis of knowledge and practice, but as inextricable from its everyday processes within the mind and work of the individual psychologist. To be clear, this did not simply apply to the now narrower field of clinical psychology. Rather, counselling psychology was included in the 1940s concept of clinical psychology (Baker & Benjamin, 2000). This inclusion can be seen both in the practice and research domains advanced by the Boulder conference and by the historical placement of CP at the time. Still of note, leaders in the guidance and counselling movement held a conference of their own in 1951 where they simplified their name to "counselling psychology" and endorsed the SP model of training (Cautin & Baker, 2014). Not long after, the *Journal of Counseling Psychology* was founded, further supporting a research foundation for the profession (Blair, 2010).

While referring more specifically to the American context, Vespia and Sauer (2006) have argued that CP has remained more closely wedded to the SP model compared to clinical psychology and other related disciplines due to less interference from alternative training models. These authors also highlighted the continued affirmation of the SP model throughout the decades since Boulder, as well as the multiple efforts made in the US toward clarifying the model in form and implementation.

Scientist-Practitioner Model Interpretations

When proposed by Shakow and others in the 1940s, there was foremost acknowledgement of the need for more research on training before determining the exact requisite ingredients of the SP model (APA Committee on Training in Clinical Psychology,

1947). The Shakow Report stated its focus on clarifying *goals* of training programs without creating an explicit and detailed program of study. Such broad goals would encourage flexibility in implementation in order to preserve a spirit of research and experimentation more appropriate for these early stages of standardized training. Thus, in the beginning, the SP model was an overall imperative and a collection of suggestions for consideration. Likewise, today the SP model is generally a "popular philosophy" rather than a set program of study (Horn et al., 2007, p. 808).

Despite these somewhat vague beginnings, the SP model continues to be endorsed by training programs and professional organizations (CPA, 2011; Haverkamp et al., 2011), both in North America and internationally (Barrett et al. 2020; Blair, 2010; Vespia & Sauer, 2006). Of course, with its somewhat flexible and general beginnings, over time it has been more widely interpreted. While initially conceived of as a training model, increasingly it is investigated and invoked outside of the training context as a general practice model (Blair, 2010). In this sense, psychologists *are* scientist-practitioners, with the imperative to work from this lens.

In its current interpretation, the SP model is thought of most often as an integration of science and practice (Ridley & Laird, 2015). This integration includes clinical practice supported and informed by research, and research supported and informed by real-world practice. Although sometimes intended or thought to mean that all psychologists engage in research in the more classic sense (i.e., performing research studies; Aspenson et al., 1993; Ridley & Laird, 2015), the SP model is widely interpreted as more general than that, with practitioners using or consulting research without necessarily conducting it themselves (e.g., Apostolopoulou & Skourteli, 2015; Bieschke et al., 2004; Chwalisz, 2003). Luebbe et al. (2007) interpreted the SP model as intending to "equip students with skills to apply basic scientific principles, including observation,

hypothesis generation, and hypothesis testing, in their patient practice" (p. 644). This interpretation sees the clinician as approaching work *as a researcher*. Others have pulled back from the idea of clinician-as-researcher, suggesting that the SP model is more about having a scientific mindset or attitude (Ridley & Laird, 2015; Vespia & Sauer, 2006).

Along these lines, George Stricker and colleagues produced many decades of literature attempting to clarify the SP model as initially intended, focusing more on scientific attitudes and approaches to practice (Horn et al., 2007). In this conceptualization, gaining clarity about what the words *scientist* and *researcher* mean becomes important. If the scientist side of the hyphen is interpreted as *being a researcher*, then the goals and tasks of a training program are to produce psychologists who will *do* research and who may even spend their time between the two activities in the idealized equal split. If thought of this way, science and practice might seem less compatible, as they are posed as disparate *activities* (Stricker & Trierweiler, 1995). The viability of such a split is perhaps especially compromised because of the common claim that most psychologists enter the profession with clinical, and not research, aspirations (Addis, 2000; Horn et al., 2007). If, instead, the scientist side of the hyphen is about an attitude or an identity—essentially an approach to practice—then the scientist and the practitioner seem not only reconcilable (Stricker & Trierweiler, 1995), but even inextricable.

Viewing the role in this latter way, Stricker and Trierweiler (1995) see psychologists as scientists by way of *how* they practice, not because of research activities, strictly speaking. In their interpretation, science informs practice through three broad avenues, including (a) applying psychological science findings, typically about explanations and treatment for various presenting problems; (b) using scientific or critical thinking; and (c) evaluating the integrity of scientific conclusions drawn from and about the clinical encounter. While these avenues will be explored

in more detail in a later section, in the broadest sense this model approaches everyday clinical tasks and interactions as strengthened by some form of science, either through evidence derived from research or through a science-oriented lens toward decision-making.

Evidence-Based Practice

In a more recent iteration, the SP model seems most commonly equated with the evidence-based practice (EBP) movement. This movement has its roots in evidence-based medicine (EBM), an initiative largely attributed to American Canadian physician David Sackett (1934–2015) and influenced by many decades of academic work (Lilienfeld & Basterfield, 2020). Sackett et al. (1996) defined EBM as "the conscientious and judicious use of current best evidence from clinical care research in the management of individual patients" (p. 71). Parallel to Stricker and others' interpretations, Sackett and colleagues had "wanted to develop a method that let practitioners engage in the process of evidence-based medicine in real time, during the actual clinical encounter to overcome automatic, unconscious decision-making biases" (Spring, 2007, p. 616). As such, clinicians could integrate science and practice in their daily work, moving away from decision-making relying on tradition or personal experience (Rousseau & Gunia, 2016).

EBM subsequently was updated based on a "three-legged stool," integrating three important realms: research evidence, clinical expertise, and patient factors or context (Lilienfeld & Basterfield, 2020). Again, the purpose of this effort was to improve patient care, an imperative across many professions, and thus easily adopted by the fields of clinical and counselling psychology as well (Lilienfeld & Basterfield, 2020; Spring, 2007). In 2005, the APA approved as policy the statement that EBP is "the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences" (APA Presidential Task Force on Evidence-Based Practice [APA EBP], 2006, p. 273). This mirrors the "three-

legged stool" of EBM (Lilienfeld & Basterfield, 2020).

The APA EBP's report was not without controversy. It was followed by various concerns about its failure to weigh the three "legs" relative to one another, perhaps allowing clinical expertise or patient preferences to dominate over research evidence, despite strong opinions that this latter element should be prioritized (e.g., Baker et al., 2008; Lilienfeld & Basterfield, 2020). In response, Wampold et al. (2007) clarified that these three components were not seen as in tension or as opposed to one another, and that a clinician's failure to attend to strong research evidence and instead to base decisions either on more limited evidence or simple clinical opinion would not be EBP. Furthermore, throughout the APA EBP (2006) report, research evidence is strongly incorporated into all three components of EBP. The clinical expertise component, for example, contains a plethora of research-based information on important therapist factors and considerations. In other words, these two components seem, in the minds of its authors, to remain based in evidence. Still, scholars have continued to suggest that this conceptualization of EBP is simply too vague and thus enables clinicians to claim (and to believe) that they are engaged in EBP because they are relying on client preferences or their clinical expertise (no matter how non-research based; Dozois, 2013; Drapeau & Hunsley, 2014). This faulty reliance seems easily possible without a close reading of the task force report or an understanding of research and its importance.

Particularly of interest, the CPA's own Task Force on EBP provided a narrower definition, citing the importance of applying the "best available research evidence in the context of specific client characteristics, cultural backgrounds, and treatment preferences" (Dozois et al., 2014, p. 155). In other words, clinical expertise was left out and research evidence was prioritized. While Dozois et al. (2014) acknowledged the controversy surrounding what should

be considered legitimate "evidence," they provided a rationale for an evidence hierarchy and gave sources top priority if they had the best controls against validity threats. At the bottom of the hierarchy, Dozois et al. (2014) placed unpublished data, professional opinion, and prior experience. Thus, the CPA task force drew a strong boundary in terms of clinical opinion or experience, suggesting that opinion and experience cannot even be thought of as truly evidence based. To be clear, the APA EBP (2006) explained their notion of clinical expertise as "competence attained by psychologists through education, training, and experience that results in effective practice" (p. 275). In other words, the category of clinical expertise as conceived of by the APA is decidedly more evidence-based (and seems to require effective practice results) than is the CPA notion of clinical opinion or experience.

What these models of EBP demonstrate is that despite great overlap, the EBP movement is not a singular imperative with clearly operationalized components, just as a review of the SP model has evinced. Furthermore, the SP model and EBP, as well as any move toward science in professional psychology, highlight the foundational tensions in an applied science profession. Namely, can and should practice be based on science? Or is professional psychology an "art" and somehow in problematic tension with science? Especially prominent: what role do expertise, experience, and intuition play, and what do these concepts entail?

The Scientist-Practitioner Model Rationale

As for why the SP model ought to be adopted in the first place, the most cited rationale is for the positive improvements it should bring to practice. Having a foundation of research-practice integration is relevant across professions that apply a domain of research knowledge, since such integration reinforces practitioner accountability for maintaining up-to-date best practices in fields with evolving research findings (Spring, 2007). In essence, as more research

becomes available about the mechanisms and treatments of various illnesses, scientist-practitioners will incorporate those findings and better serve clients or patients.

To understand the importance of SIP one need not look any further than prescientific medicine and psychiatry. From bloodletting to lobotomies to hysterectomies to physicians not washing their hands, scientific knowledge has informed health practices by telling us what *does not* work, as well as what might work better (Lilienfeld & Basterfield, 2020). In short, science has saved millions of lives and provided the incredible advances seen in health care today.

Another rationale for the SP model is that through producing more research-capable psychologists, the field will continue to have a foundation of research knowledge from which to draw (Gelso et al., 2013). When the model was endorsed in 1951 by counselling psychology, the APA Committee on Counselor Training (1952) declared that "on counseling psychologists falls the chief responsibility for conducting the research upon which depends the possibility of more effective counseling" (p. 176). In this same vein, basing practice on research not only provides a solid foundation, it legitimizes the profession (Domene et al. 2015; Young & Lalande, 2011). Indeed, Cautin and Baker (2014) explained that in the earliest days of advocating for professional psychology as scientifically bounded, the profession sought to credibly distinguish itself from "pseudo-psychological" healers and practitioners without training (p. 17).

Although not as often considered, having a scientific foundation for practice can provide clinicians with reassurance and confidence, especially when faced with difficult client situations or in the early stages of their careers (Addis, 2000). Considering that believing in the treatment provided appears to be a common factor in effective psychotherapy (Wampold & Imel, 2015), having research support for one's approach can not only calm the nerves of the clinician but can likely improve treatment outcomes.

The APA EBP's (2006) own rationale for EBP was "to promote effective psychological practice and enhance public health by applying empirically supported principles of psychological assessment, case formulation, therapeutic relationship, and intervention" (p. 273). In all, many benefits come from SIP, but most of them can be subsumed under the umbrella of improved client care.

Criticisms and Controversy

The move toward the SP model and EBP has always involved criticism and controversy, and quite a lot of it. Some of the controversies are complex and difficult to fairly represent. However, important themes stand out in the criticism typically levelled against EBP or the SP model, particularly involving (a) misconceptions, (b) arguments still fundamentally *toward* science, (c) professional psychology roots, and (d) philosophy of science issues.

Misconceptions

Many criticisms of EBP and the SP model arguably can be deemed misconceptions, including equating EBP with only one form of evidence or one methodology (Beck et al., 2014; Chwalisz, 2003; Dewell & Foose, 2017), neglecting the idiographic (e.g., Cha & DiVasto, 2017), and claims of deprioritizing other influences on practice (e.g., Hunsberger, 2007). Lilienfeld et al. (2013), Wampold et al. (2007), and others have systematically responded to many of these claims. It can fairly be assumed that EBP, at least as it is advanced here, does not claim allegiance to one single methodology or data set, does not neglect the idiographic, and does not seek to ignore relevant practice variables.

A particularly interesting type of misconception is the common caricature of the "scientist" in anti-EBP or anti-SP literature that strikes as a straw man fallacy, seriously calling into question the actual existence of what is being rallied against. For example, Healy (2017)

reduced the scientist-practitioner to a "detached laboratory scientist" (p. 238) who uses cold expertise to control clients. Dewell and Foose (2017) claimed that the move toward EBP demonstrated a "focus on reproducing measurable content rather than engaging in an interpersonal process" (p. 113). Similarly, Berg (2019) likened an EBP approach to an impersonal, paternalistic, patient-blaming business transaction void of humanity. These notions of EBP seem decidedly out of touch with what any researcher or practitioner would reasonably assert or promote. Surely, no helpful starting place for discussions of SIP begins with uncharitable and hyperbolic representations of the "enemy."

Arguments Toward Science

Even within the EBP movement, tension has arisen between two major approaches: supporters of the common factors (CF) theory and supporters of more "specific factors"—the empirically supported treatment (EST) approach.

Proponents of the EST approach supposedly want tighter controls on evidence, highly prizing ESTs, randomized controlled trials (RCTs), and scientific plausibility (Weinberger, 2014). However, the "EST approach" is somewhat of a misnomer considering that proponents of this version of EBP have repeatedly clarified that EBP for them is *not* synonymous with ESTs or RCTs (e.g., Lilienfeld et al., 2013). Rather, supporters of specific factors tend to advance a broad scientific basis for practice *including* support for the superiority of certain treatments for certain presenting concerns as largely determined by RCTs. Other evidence-based stipulations have also been advanced. For example, after publication of the APA EBP (2006) report, Baker et al. (2008) criticized the inclusion of therapist and client factors, deeming them "prescientific." Stuart and Lilienfeld (2007) also took issue with the APA EBP's failure to define or rank evidence, leaving it open to reliance on clinical intuition or tradition.

Notably, the APA EBP (2006) report heavily overlaps (and shares authors) with the CF approach. This latter approach, originating with psychiatrist Jerome Frank (Wampold & Imel, 2015) but advanced by Wampold and Imel (2015) as well as Laska et al. (2014), highly prizes factors common across treatments (e.g., therapeutic alliance, expectancy effects, goal consensus). Proponents of this approach also tend to widen the notion of evidence, disagreeing with the narrowness of the RCT-focused demands of Baker et al.'s (2008) or Lilienfeld's versions of EBP. The CF theory is strongly based upon evidence that specific therapies employed have equal outcomes for nearly all clinical problems, provided the therapy used is "bona-fide" (Wampold & Imel, 2015; Wampold et al., 1997). In this, the CF approach runs counter to the EST approach, and Wampold and Imel (2015) have spent substantial time explaining the flaws in the EST and "stricter" EBP approach, just as others (e.g., Baker et al., 2008; Lilienfeld & Basterfield, 2020; Lilienfeld et al., 2013) have criticized the basis of the CF theory, predominantly on empirical grounds.

In large part, the tension between common and specific factors is a false dichotomy (Weinberger, 2014); both "sides" have shown willingness to incorporate the other's important factors, *if* they can render themselves robustly evident (e.g., Laska et al., 2014; Lilienfeld & Basterfield, 2020). Thus, these tensions seem to be about who is doing better science or relying on stronger evidence. In this sense, the factions appear to be engaged in a central scientific phenomenon: skeptically moving through the self-correction process. Indeed, both sides advocate fundamentally *for science*. Laska et al. (2014), for example, argued that in EBP "*any* variable shown to influence outcome is scientifically important" (p. 468), and Lilienfeld and Basterfield (2020) acknowledged that EBP goes in the direction of the most compelling research data. As a conclusion, science prevails regardless of their disagreements.

Likewise, despite various authors who lament the failures of current science (e.g., Ashcroft, 2017), most still strongly end their lamentations with claims that science is also the best we have. Those who criticize and complain in these ways are fundamentally advancing an increasingly strong scientific direction, not rallying against it.

Professional Psychology Roots

In his review of the SP model, Blair (2010) asked, "How scientific can a counselling psychologist be without buying into a narrow and rationalistic view of evidence that forfeits some of the key values of counselling psychology?" (p. 23). Such a question suggests a divide between CP's roots or identity and science-based practice, at least in some forms. For example, Blair briefly explored the ways in which contending with science in CP can mean flirting problematically with the medical model. This contention was posed as running counter to CP's emphasis on "relevance of meaning, subjectivity, values, feelings, mutually constructed realities, perceptions, insight, fluidity and multiplicity of selves" (p. 20).

Some scholars have lamented how an evidence-based or medical model approach to practice threatens the social justice aims of the profession as well, placing problems within people instead of in society (e.g., Albee, 2000; Hage, 2003). Others have suggested that psychotherapy has been negatively influenced by the medicalizing forces of health insurance, thereby diminishing its actual core identity (i.e., a relational process with clients mostly free from mental illness; Elkins, 2009). Another common complaint warns that EBP sacrifices the multicultural and idiographic values of CP (e.g., Hage, 2003). On the other hand, several scholars (e.g., Bernal et al., 2009; Lilienfeld et al., 2013; Wampold et al., 2007) have explored the ways in which EBP does not need to be thought of as running counter to multicultural considerations, and, rather, that it can and should (and does) support attention to these variables.

Overall, some of these criticisms seem to fall prey to a straw man argument, conflating EBP with the medical model and essentially arguing against a false enemy. This is a familiar refrain. Ghaemi (2010) has argued that the foundation of Thomas Szasz's criticism of psychiatry, a popular postmodernist denial of the existence of mental illness, is a "straw man called 'biomedical reductionism,' which exists in reality, it is true, but which also exists for academic sport" (p. 198). In some ways, to refuse the medicalization of psychiatry or professional psychology is to bolster an alternative, "rightful," and allegedly superior, identity.

In counselling psychology, many of these identity-based criticisms are grounded in views of CP identity that have not been clearly or ubiquitously established (Bedi et al., 2012). Claims about CP identity are generally a faulty foundation for justifying certain universal imperatives for approaching practice. This does not mean that criticisms about a mismatch between science and CP identity should be ignored, but rather that they are largely a matter of (refutable) opinion.

Philosophy of Science: What is Science?

Many of the arguments for and against psychology as a science, and psychotherapy as possibly (or impossibly) scientific, rest on basic philosophy of science arguments. Ponterotto (2005) explained that "*philosophy of science* refers to the conceptual roots undergirding the quest for knowledge" (p. 127). This includes a variety of "-ologies," and those particularly in focus here are ontology, epistemology, and methodology. Ontology concerns the nature of reality and thus what is possible to know about that reality. Epistemology involves our theory of knowledge in terms of how we might come to know things and constraints on our knowing. Methodology is more tightly bound to research processes and methods, and although taking a smaller stage here, concerns a branch of epistemology in terms of our methods of inquiry.

Beliefs and understandings about these various elements of science, although usually not

explicit, are contained within arguments about the place of science in psychology. In other words, scholars and laypeople have differing opinions about what can be known about people and psychology, how we can best come to know it (if at all), and what knowledge is best for the basis of counselling practice. Of course, philosophy of science is a vast field of study with centuries of arguments, so no simple answer is achievable here, and this exploration will be limited. Still, making some of these arguments explicit should help to conceptualize the place of science in CP, at least for the purposes of this study.

Unmeasurability. A historical tension in professional psychology is in conceiving of it as art "or" science. This language appears in the 1947 Shakow Report on the earliest formulation of the SP model, just as it is debated today (e.g., Lilienfeld, 2010). Often professional psychology is conceived of as both an art *and* a science (e.g., Goldfried, 2000). Linked to this line of reasoning is the degree that the counselling process can be captured and understood by science, which some seem to think is *not very much* (e.g., Dewell & Foose, 2017).

Indeed, the counselling process is complex, and some scholars comment on the inevitable paralysis that would result if clinicians waited for research evidence to inform every decision (Addis, 2000). Many others highlight the importance of things like flexibility, spontaneity, and wisdom (e.g., Young & Nicol, 2007), which are typically posed as separate from or opposite to science. Hunsberger (2007) represented this perspective well, claiming that the subject of psychology—"the human psyche, or mind—is by definition subjective, abstract, and unmeasurable" (p. 615). Unfortunately, Hunsberger resorted to the medical model caricature of EBP, claiming that it could not possibly understand "the thoughts, feelings, attitudes, and beliefs that constitute psychic life" (p. 615). In his article, Lilienfeld (2011) explored common misconceptions that people have about psychology including it being mere common sense,

struggling to produce robust or useful scientific results, and generally being unamenable to science.

Akin to this is the claim that psychology is so complex as to be too unruly for measurement. Lilienfeld et al. (2013) represented this as a kind of unnecessary nihilism, refusing to equate *difficult* with *impossible*. Lilienfeld et al. also shared a helpful (though clearly biased in its own philosophy of science) observation from E. L. Thorndike that "if something exists, then it exists in some quantity. If it exists in some quantity, then it can be measured" (p. 893). Furthermore, Lilienfeld et al. cited improvements in science and measurement that are increasingly allowing for better measurement of therapeutic and psychological factors.

Maree (2015, 2019) has also refuted the idea that there is something uniquely unmeasurable about meaning or other intangible concepts in the CP context. Likewise, Petocz explained that "complexity is not a criterion for exclusion from scientific investigation. Nor, however complex, do such meanings require any special, mysterious, non-natural processes or realms outside those covered by ordinary categories of psychological science" (p. 711). In other words, these scholars have refuted the notion that the SP model is untenable because of CP's complex or intangible subject matter. Furthermore, even if qualitative variables are not measurable in the way that quantitative ones are, this does not preclude them from scientific investigation (Michell, 2001).

In their own (perhaps uncharitable) response, Baker et al. (2008) compared the various defenses of clinical psychology as unmeasurable or irreducible to science to prescientific medicine. They detailed the ways in which the current debate about EBP in professional psychology mirrors the ongoing 2000-year-old debate in medicine between "those who believed that medical decisions should be based on science and those who valued traditional empiricism

(i.e., informal individual observation), personal clinical experience, and tradition" (p. 77). Baker et al. explained that, dating back to Aristotle, medicine was alleged to be an art or craft, more reliant on clinical experience than on science. In defending this view, proponents would often claim that science was incapable of meaningfully informing clinical work because of the uniqueness of individuals, the complexity of clinical work, or because scientific findings lagged too far behind. Viewed from this lens, Baker et al. contended that the arguments against science in professional psychology today are recycled and dubious excuses.

To be fair, in their review of EBP across multiple professions, Rousseau and Gunia (2016) indicated that applied professions commonly struggle with insufficient evidence bases due to both un- and under-researched topics. However, there is a difference between unresearched and unresearch*able*, the latter of which is claimed by scholars such as Hunsberger (2007). If psychologists are claiming unscientific positions on unsound grounds resonant of prescientific medicine, the move toward science-based professional psychology seems in its earlier stages of development but ever-important.

Scientism. Perceptions of science in the field of CP are of particular importance, especially because misconceptions seem common. As mentioned, a typical characterization of SIP is as a medical model manifesto, usually rife with detached, cold, expertise-wielding scientists seeking domination and an escape from humanism. Many scholars have written lucidly about this as "scientism," a caricature of science that renders it so extreme and absurd as to make toppling it easier (e.g., Maree, 2015; Petocz, 2011). Such scientism also leads to problematic polarization of attitudes, with some deifying and others demonizing science (Petocz, 2011). Briefly, scientistic notions of the SP model or EBP or science in general pose science as simply quantitative, positivistic, and concerned only with the objective or directly observable (Petocz,

2011; Maree, 2015). No wonder so many find it untenable as an approach to counselling practice and rally against it as if it might be the downfall of the entire profession (e.g., Dewell & Foose, 2017).

Indeed, these extreme ideas of science can be so strong that scholars will see them in representations of the SP model that arguably do not contain them. For example, in their criticism of the APA EBP's (2006) report, Wendt and Slife (2007) countered that the task force failed to be transparent about its philosophy of science and effectively supported an empirical foundation biased toward the objective. These scholars claimed that qualitative methodology was given lower status and ignored for its own philosophy of science. In their reply to this criticism, Wampold et al. (2007) clarified that they had purposefully not entered the philosophy of science debate, but that they had nowhere defined evidence as necessarily objective. They did acknowledge that "the evidence-based enterprise rests on an empirical philosophy of science.…Evidence, by its very nature, is derived from data, and consequently the evidence-based practice enterprise is by its very nature empirical" (p. 617). They also clarified that searching empirically for observable data does not necessitate objectively visible data, as Wendt and Slife (2007) seemed to presume, but rather, that data are often observed indirectly and creatively. Finally, Wampold et al. (2007) clarified that the task force had not made any efforts to prevent non-empirical approaches.

In Wendt and Slife's (2007) concept of science, qualitative approaches were posed as philosophically at odds with quantitative ones, instead of as simply empirically different. Postmodern or relativistic approaches often stake unique claim to inquiries into meaning, suggesting that the hard-nosed sciences are incapable of honestly representing such matters. Petocz (2011) warned that these false dichotomies and misunderstandings of empiricism signal

that the basic idea of scientific inquiry is lost.

Essentially, both Petocz (2011) and Maree (2015, 2019) have contended that the idea of positivist-only science is a tired and false trope, and that science is not so particular or demanding in the ways often claimed. Genuine science does not specify or privilege subject matter (e.g., meaning), method (e.g., measurement), variable (e.g., qualitative or quantitative), or even the concept of causation (Maree, 2015; Petocz, 2011). Furthermore, despite what is often claimed about science, it is not posed as an abstract entity separate from the human minds that conceive of and perform it. Rather, it is undertaken by naturally fallible and variously motivated scientists whose limits are acknowledged by the very nature of the scientific method. In these senses, and as opposed to scientistic views, science is more widely and simply conceived of as *critical inquiry* (Michell, 2001). This inquiry is critical precisely because it is based on the understanding that it is fallible and so must necessarily include a system of error-mitigation.

Thus, science-informed counselling psychology does not restrict itself to a narrow concept of science. Still, it is naturally empirical (Wampold et al., 2007), and deeply skeptical and self-correcting (Petocz, 2011). It is also imperfect. In reflecting upon the seeming "in-fighting" of the CF and EST groups, we can see that science is clearly taking place, with scholars using their best techniques of correction to find errors and to move ever-closer to what might possibly be knowable and thus actionable in CP practice. Thus, science does not have to look like one simple answer. It is an ongoing dialogue, including experimentation, intent on finding the most robust answers possible to our important questions. In this spirit, the APA EBP (2006) explained that "the scientific method is a way of thinking and observing systematically, and it is the best tool we have for learning about what works for whom" (p. 280).

Science-Informed Practice

Despite its fallibility, many conceive of science as the best method we have (Ashcroft, 2017; Hansson, 2017; Lilienfeld & Basterfield, 2020; Petocz, 2011). As such, some scholars have argued that a better name for EBP is *science-based* practice (e.g., Lilienfeld & Basterfield, 2020; Washburn et al., 2019). In large part this is a reaction to the common (mis)interpretation of EBP as focused only on ESTs or as promoting a narrower influence of evidence on practice. Still, many explorations of EBP clearly include a wide variety of competencies and components of practice that are fundamentally informed by science.

Lee and Hunsley (2015) indicated that "one must think scientifically in all aspects of one's professional activities" (p. 536). This includes familiarity with scientific literature as well as science-informed decision-making across treatment planning and provision of services (Hunsley, 2007). Rousseau and Gunia's (2016) broad definition of EBP cited the need for both "foundational and functional competencies" (p. 673). Namely, foundational competencies include critical thinking skills and domain and technical knowledge, while functional competencies span the necessary stages of seeking out and using evidence in practice. In other words, this latter process involves asking the right questions (knowing what is unknown), finding robust answers to those questions, sufficiently evaluating the robustness of what is found, competently applying this new vetted knowledge, and then assessing resultant outcomes. These functional competencies, or actions, rest upon foundational knowledge and skills.

In sum, today's discussions about the SP model have widened to include multiple ways that science can beneficially inform practice. As has been asserted here, the idea of science is not a narrow one, but it does seek rigour. From this foundation, it is important to begin to specify some of the ways that practitioners can (and should) engage in SIP. Overall, SIP involves

proficiencies in various attitudes, knowledge, skills, and behaviours (Beck et al., 2014; Rousseau & Gunia, 2016), all of which are more or less supported by contextual factors (e.g., norms, autonomy, opportunity; Rousseau & Gunia, 2016). Importantly, these elements overlap such that attitudes influence knowledge, which influences skills, in turn which enable behaviours, and not necessarily in that order.

Attitudes and Beliefs

A common starting point for SIP is at the level of individual dispositions. If a person values and cares about science or research, or the fundamental components therein, they are more likely to be motivated to learn about and incorporate science into their practice (Ross et al., 2017). Some hold the position that the scientist-practitioner is fundamentally a person who identifies with a basic scientific attitude and approach to practice (Ridley & Laird, 2015). In this vein, intellectual humility is often cited as the central personal component to a scientific approach (e.g., Meichenbaum & Lilienfeld, 2018), and associations have been found between specific dispositions and tendencies toward slower (more scientific) and faster (more intuitive) thinking (e.g., Stupple et al., 2017). In this category, we might include openness to feedback, a conscientious interest in self-improvement and self-reflection, curiosity, self-efficacy, and skeptical attitudes, among others. Clearly, these attitudes overlap not only with personality and basic dispositions, but with knowledge, skills, and behaviour, as well.

Knowledge

Knowledge can be called broadly *scientific literacy* for our purposes. That includes various domains of knowledge, such as foundational knowledge, scientific practice knowledge, and research literacy, all of which strongly link to skills and behaviours.

Foundational Knowledge. Psychologists often claim to work from a scientific

foundation (e.g., Beatch et al., 2009; Bieschke et al., 2004), including knowledge of general sciences (e.g., neurobiology; Young & Lalande, 2011). In the realm of the most directly relevant science, many scholars acknowledge that SIP requires basic knowledge in psychological research (e.g., Bieschke et al., 2004; Dozois et al., 2014). For psychologists to practice scientifically, they need to know the current state of the research on treatment, client factors, therapist factors, and other variables that impact both therapeutic process and outcomes (Tasca et al., 2018). Relatedly, foundational knowledge areas that may not be taught in all levels of training for all psychologists but that are arguably of central importance include psychometrics (Beck et al., 2014), psychopathology, normal development, and epidemiology (Hunsley, 2007), as well as memory, cognition, perception, and emotions (Overholser, 2010). From an ethical standpoint, the CPA (2017) *Canadian Code of Ethics for Psychologists* suggests that the "discipline of psychology," as it relates to professional psychology, includes the scientific method and psychological knowledge.

Lilienfeld et al. (2013) outlined some of the problematic consequences of having insufficient knowledge about psychological science and instead subscribing to common myths or misconceptions. For example, memory myths can lead to problematic interventions (e.g., memory recovery) or erroneous conceptualization of client problems (e.g., repression of past trauma), just as myths about the "primacy of early experience" (p. 890) can lead to an overemphasis on childhood adversity and a failure to account for humankind's predominant resilience. Problematic interventions may be chosen without an understanding of the research, such as treating alcohol dependence based solely on abstinence. Relatedly, the CPA (2017) ethics code indicates the importance of protecting the profession against misused and misinterpreted psychological knowledge (Standards II.5, IV.11, IV.13, and IV.24).

Clients frequently present with myriad concerns overlapping with biological science (and its many subdisciplines), including sleep issues, anxiety, sexual dysfunction, emotional dysregulation, and so on. Psychologists have an ethical responsibility to limit their practice to their areas of competency (Standard II.6; CPA, 2017) and thus frequently will refer medical problems to medical practitioners. However, in working with clients on the psychological components of their at least partly biological troubles, they are better off if informed by facts. At minimum, psychologists should not base practices that contend with biologically influenced issues on anything that contradicts what is known, meaning that some foundational knowledge is necessary to steer a clear course in treatment. As such, some scholars have emphasized the importance of having baseline knowledge in areas such as neuroscience, genetics, pharmacology, social science, physiology, and more (Holmes et al., 2018).

Research Literacy. When faced with the breadth of the above expectations, it is clear that an important component of SIP is the ability to find, appraise, and use research knowledge when something is unknown to the practitioner (Hunsley, 2007). Furthermore, the research that informs applied professions is always updating, with some estimating that professional psychologists become half as knowledgeable between seven to seventeen years after graduation, depending on the area of specialization (Neimeyer et al., 2014). Interestingly, counselling psychology had one of the higher estimated half-lives (at 13.9 years), indicating that it is perceived as a field with research that updates slower (or that its research endures for longer) than most other branches of professional psychology. The anticipated half-life in counselling psychology ten years from when surveyed was 11.48 years on average, suggesting that the half-life will decrease.

Either way, approaching one's work with a spirit of remaining abreast of research

findings is an ethical imperative according to the CPA (2017) *Code of Ethics* (Standards II.9, IV.1, and IV.3). A scientifically literate psychologist needs to know how to ask "answerable clinical questions with a reliance on scientific strategies" (Bieschke et al., 2004, p. 717). This involves knowing that there is something unknown and then knowing how to seek information to fill that gap beyond mere advice or popular opinion. Upon accessing relevant information (e.g., research studies or practice guidelines), it is important for a practitioner to know how to assess the quality of the evidence found (Spring, 2007). Due to the vastness of psychological literature, most perspectives can cite supporting evidence (Wampold & Imel, 2015). Thus, it is important for a psychologist to be able to assess the strengths and weaknesses of various methodologies and to be an expert research consumer (Beck et al., 2014). Disagreements between the CF and EST factions about how exactly to deconstruct and interpret various research studies demonstrates the scientific astuteness required to truly understand and sort through the literature. While no psychologist need understand everything about research methodologies and statistics, there is a point at which a lack of understanding means that the psychologist cannot meaningfully engage with research literature in any critical or deep way.

Scientific Practice Knowledge. In a general sense, choosing how to treat or help clients is more than simply choosing a type of therapy, since the factors impacting outcomes include client and therapist characteristics and common process variables across treatments (Tasca et al., 2018). As mentioned, to be science-informed, a clinician needs to be well-versed in the literature about what impacts process and outcomes (Beck at al., 2014; Hunsley, 2007). In addition, the CPA (2017) *Code of Ethics* specifies that treatment decisions are based in part on the best available evidence, operationalized as "the most trustworthy and valid according to a hierarchy of evidence" (p. 9). This inclusion appears to indirectly reference the evidence hierarchy as laid

out in the CPA task force report on EBP (Dozois et al., 2014), although this connection is not made explicit.

Other central and debated components of science-informed treatment choice include scientific plausibility and the priority of specific treatment types. As part of the move from EBP to science-based practice, some scholars have argued that treatment be grounded in basic science, especially scientific plausibility (Baker et al., 2008; Gorski & Novella, 2014). With some interpretations of EBP, evidence may correspond to clinical trial outcomes alone instead of to cogent scientific rationales, which is thought to create problems for an actual grounding in science (Washburn et al., 2019). Especially in mental health professions where factors often falling under the wide umbrella of "placebos" have a large and legitimate impact on outcomes, using outcome studies alone opens the field to decidedly unscientific practice components. For example, Eye-Movement Desensitization and Reprocessing (EMDR), a contemporary and popular psychological treatment, has dubious scientific plausibility and yet shows outcomes on par with other more scientifically cogent trauma treatments, presumably because of its common factors (Wampold & Imel, 2015) and other more plausible treatment components. Although some might regard this state as evidence that what matters to treatment is *not* scientific plausibility per se (Wampold & Imel, 2015), the inclusion of pseudoscience (treatments that sound like science without having any coherent scientific basis, and often trafficking in pseudoscientific "sleight of hands"), undermine the rigour of the psychological field, to say nothing of public confidence (Baker et al., 2008; Lilienfeld, 2011; Washburn et al., 2019). It is also a bad sign if clinicians are "taken in" or fooled by treatments with the markings of pseudoscience without them even noticing.

Washburn et al. (2019) clarified that science-based practice does not require clear

scientific mechanisms for all acceptable treatments since the early scientific stages of the profession render that mostly impossible. If psychology is science-based, our profession should at least not promote practices that run counter to basic science. Promoting treatments that lack scientific plausibility as equal to more scientifically plausible ones simply because they seem to have the same outcomes undermines the profession's supposed commitment to science and psychology. Thus, to hold true to its title of counselling *psychology* and to its claim of being science-based, it should either embody those things or else clarify its name or professed identity.

While the medical profession is not a clean analogue to professional psychology (particularly due to the nature of placebos and the mechanisms of illness being somewhat unique to each discipline), Gorski and Novella (2014) warned against the money, time, and treatment opportunities wasted when investing in implausible "alternative" medicine treatments. With scarce health care resources across the board, such waste is problematic and unethical (Gower & Gaine, 2023). Another rationale for striving for scientific plausibility is to remain pointed in the direction of science in an effort to increasingly understand mechanisms of illness and change (Gaudiano et al., 2015). Doing so may give us a better chance of finding the relevant mechanisms rather than having a field increasingly muddied by unscientific components.

However, there is some controversy. If one takes the common factors view (Wampold & Imel, 2015), then the things that make therapy work are not in the realm of scientific plausibility except insofar as a psychologist can convincingly explain the rationale of a treatment to a client. Still, Wampold and Imel did not garner from the evidence that this means that "anything goes." Rather, they argued that treatments should have a "reasonably defensible psychological basis" (p. 274). They cautioned against engaging in fringe therapies or anything not "bona-fide." They also indicated that it is ultimately up to the therapist to decide what overly deviates from an

acceptable psychological basis, which infers that a therapist must have some understanding of psychological science. Perhaps, then, either from the side of believing in mechanisms of change and scientific plausibility, or from the side that relies not on scientific plausibility but at least upon some degree of psychological basis, psychologists need to be informed by science.

Other considerations regarding scientific practice knowledge involve science-based knowledge about the processes and content areas of assessment and diagnosis. Assessment is really one component of clinical decision-making, a broad collection of attitudes, skills, and knowledge that ought to include what is known about best (and less than best) practices. For example, the various biases and problematic heuristics that sully clinical decision-making (and diagnosis) can be insidious by their nature, and thus one antidote is simply knowing they exist and in what forms.

Skills

Skills in the realm of SIP overlap with all other categories (i.e., attitudes, knowledge, and behaviours). Relevant skills include clinical decision-making skills (such as hypothesis testing, systematic observation, and case conceptualization) and research skills (with much overlap with research literacy). What is the focus here, however, is the major components of critical thinking that should encompass all science-based practice components.

Critical Thinking. Critical thinking is often thought to be strongly related to SIP and is an important component of health care practice and sound decision-making (Dozois et al., 2014; Rousseau & Gunia, 2016; Williams & Wright, 2019). In their review of current research on critical thinking in health professions, Williams and Wright (2019) explained that critical thinking is "generally characterised as a set of cognitive skills and dispositions, such as persistent evidence seeking and inquisitiveness…fertilised by some aspects of the scientific method" (p. 1).

In counselling, critical thinking components include being critical of pseudoscience, of "counselling rhetoric and propaganda" (p. 1), and the ability to "[recognise] bad premises and fallacious reasoning that underpin counselling models and faddish interventions" (p. 2). Despite evidence that critical thinking is negatively associated with psychotherapists' inclinations toward intuitive thinking and with therapies based on dubious science, Williams and Wright clarified that there is no current research on how (and if) critical thinking impacts client outcomes, therapeutic alliance, or other important psychotherapy factors.

In terms of its intentions in the EBP literature, critical thinking is supposed to mitigate bias and errors in judgment through the use of cognitive tools and standards (Rousseau & Gunia, 2016). Thus, critical thinking is an umbrella term for a wide variety of skills and attitudes thought to be associated with SIP. It includes a scientific way of thinking, an awareness of one's limitations and propensity for bias, knowledge about logical fallacies, and so on. The importance of critical thinking is also present in the CPA (2017) *Code of Ethics*.

Protection against problematic heuristics and biases is seen as an element of critical thinking. It is well-established that human cognition can be deeply compromised by reliance on various heuristics and biases. In fact, as a major component of clinical expertise, the APA EBP (2006) recommended awareness and mitigation of common human error and bias. They reviewed the well-established literature demonstrating that clinical judgment is subject to emotional bias, motivated reasoning, and judgment errors such as confirmation bias and overgeneralization. Likewise, the CPA (2017) *Code of Ethics* explicitly states the importance of maximizing objectivity and minimizing bias. In the literature on SIP, problematic heuristics and biases are also referenced (e.g., Beck et al., 2014; Blair, 2010; Dozois et al., 2014).

Garb and Boyle (2015) reviewed various instances of bias and their problematic impacts.

For example, the “experience fallacy” leads many clinicians to believe that they will become more accurate and more valid in their assessments and judgments with experience, despite a vast literature showing no support for this relationship. In fact, to make experience valuable in terms of improving judgments or even intuition, clinicians would need to understand what is required (e.g., prompt feedback on predictions; Garb & Boyle, 2015; Rousseau & Gunia, 2016). Without information from research demonstrating *how* to improve with experience, this improvement is unlikely.

Since biases can lead to a failure to attend sufficiently to available data, clinicians can be not only poor judges, but they can experience increased confidence while making faulty judgments (Garb & Boyle, 2015). Confirmation or confirmatory bias involves attending to information in line with one’s preconceived or initial notions and ignoring data to the contrary. Garb and Boyle reviewed research demonstrating that confirmatory patterns occur early in decision-making and subsequently lead to over-confidence, which in turn reinforces a confirmatory bias. Moreover, clinicians have demonstrated persistence in their initial judgment alongside increasing confidence despite being presented with additional information that runs contrary to an initial judgment.

Another common and flawed mental process is illusory correlations, wherein two correlated events are thought to be meaningfully related when they are not (or at least not in the way thought). In a profession as rife with storytelling as is counselling psychology, illusory correlations are inevitable in both client and practitioner. Indeed, at least some of the work done in session is sorting out why things happen or where they come from. Illusory correlations easily connect events causally and then confirmation bias and overconfidence may operate to reaffirm what has been asserted.

Garb and Boyle (2015) also cited the problematic and common nature of hindsight bias (believing and justifying that something was inevitable or predictable after it has happened) and how without an understanding of the fallibility of human prediction, this bias is likely to run rampant. They also explored problematic heuristics such as the availability heuristic that sees clinicians filter present experiences through the lens of what has most recently happened or is most easily remembered. Considering that memory is fallible, and cases are too complex to be recalled in accurate entirety, Garb and Boyle highlighted the likelihood of selectively and biasedly recalling what is most "striking, vivid, or unusual" (p. 31) and thus having a biased view of the world and clients.

As a defense against many of these biases, decades of research have demonstrated the superiority of actuarial judgment over clinical judgment (Dawes, 2005; Dawes et al., 1989). Indeed, relying on bad heuristics and biases in clinical decision-making contradicts the imperative that "health care services be planned and delivered on the basis of the best available research evidence, not on the basis of highly memorable, but ultimately, unrepresentative patients whom a psychologist may have once encountered or heard about in group supervision" (Hunsley, 2007, p. 38).

At the very least, what should be taken from this brief review of some of the biases to which clinicians are susceptible is that without an understanding of bias and common but flawed heuristics, clinical work will be more subject to them without hope for correction. In other words, an important component of SIP is to understand and correct for bias and bad heuristics.

Minatory Standards. Treatment choice in therapy requires a balance between restriction and innovation (Meichenbaum & Lilienfeld, 2018). In a profession in its earlier scientific stages, there must be space for new ideas and practices. On the other hand, new ideas or innovations

must not be accepted without scrutiny (Holmes et al., 2018). At the very least, clients need to be sufficiently informed of potential risks and benefits of a treatment on offer, including the current state of the evidence (Beck et al., 2014; Blease et al., 2016). This principle of informed consent is reiterated by the CPA (2017) *Code of Ethics* (Standard I.23).

Minatory standards are an extension of this rigour and focus on client protection. These standards "warn clinicians away from clinical practices that are inconsistent with science, [and] are also essential for safeguarding the discipline's scientific foundations" (Washburn et al., 2019, p. 80). Dawes (2005) discussed minatory standards as demonstrating what a clinician should *not* do and as especially pertinent in a field where there is sometimes insufficient research to tell clinicians exactly what *to* do. To illustrate, Dawes used the example of memory recovery practices, since having a basic understanding of memory certainly categorizes this practice as an "ought not." In effect, minatory standards have much in common with critical thinking.

Washburn et al. (2019) related the need for minatory standards to pseudoscience, or "approaches that display the veneer of science but do not 'play by its rules'" (p. 80). Much has been written about the distinguishing characteristics of pseudoscience and the imperative to safeguard against it (e.g., Lilienfeld et al., 2015b; Meichenbaum & Lilienfeld, 2018), particularly considering its presence in the field of mental health (Lee & Hunsley, 2015). Common characteristics of pseudoscience include the use of scientific-sounding language, over-use of ad hoc reasoning, insufficiently supported extraordinary claims, reliance on anecdotes, a confirmation approach (versus falsification), reversal of the burden of proof, absence of self-correction, and distance from basic science.

Meichenbaum and Lilienfeld (2018) detailed the need to guard against pseudoscience to protect clients from overhyped therapies that cannot deliver on their promises and thus may be

demoralizing to clients. Meichenbaum and Lilienfeld also reinforced the need to have healthy levels of self-doubt (and doubt in therapeutic claims) to protect against therapies that may go past unhelpful to harmful. These notions are reiterated by Wampold and Imel's (2015) warning against fringe therapies that pose a risk to therapists and that damage the profession. Although anecdotal, Addis (2000) shared that his "skepticism regarding the scientific basis of psychotherapy…kept [him] from practicing bizarre 'fringe' therapies with little or no empirical basis" (p. 60). Protection against fringe therapies is important, especially since pseudoscience easily casts a spell over those not armed against it. Pseudoscience is often attractive in its certainty and is popular in the public realm, where "pop psychology" and public dialogue are often informed by folklore, pseudoscience, or poorly interpreted science (Hansson, 2017; Lilienfeld et al., 2013; Tavris, 2015). Another problem is that once a dubious treatment gains traction, it often persists despite satisfactory or even overflowing evidence to its contrary (e.g., Ganz et al., 2018). Worse, even when consistently reiterated that a treatment does not meet robust scientific standards, its proponents can use the flawed logic and tactics of pseudoscience to continue its promotion (Bakker, 2013).

In the APA's (2013) guidelines for training in undergraduate psychology, scientific reasoning and critical thinking skills are highlighted as significant competencies. Two intentions of these APA guidelines were to reinforce psychology as a science and to sufficiently prepare graduates for advanced training and work in psychology. As such, it seems fair to extrapolate these standards beyond the undergraduate level and onto psychologists themselves. Specifically, the guidelines state that students will "develop plausible behavioral explanations that rely on scientific reasoning and evidence rather than anecdotes or pseudoscience" (p. 20). The guidelines also indicate that students should be able to recognize common logical fallacies (including biases

and heuristics) and avoid engaging in them. If psychologists themselves have the competence to understand basic research methods, basic science, and pseudoscience red flags, they will be better armed against poor-quality research and implausible treatment options, and they will better protect their clients and the profession in general.

Relatedly, the APA has also published Competency Benchmarks for Professional Psychology (APA, 2012) to assist training programs in designing robust programs of study. One of the six competency clusters included is *Science* which itself mentions "critical scientific thinking" and other scientific and research literacies, although only very generally (APA, n.d., p. 6). However, there are no mentions of pseudoscience, bias, or scientific plausibility (as in the undergraduate guidelines). Perhaps the expectation is that these latter competencies were learned at the undergraduate level or are subsumed under critical thinking.

Behaviours

Put simply, behaviours include the performance of some action. In the context of SIP, attitudes, knowledge, and skills can be operationalized into some kind of behaviour, including self-study and development, the application of research knowledge in interventions, and engaging in effectiveness monitoring.

Effectiveness Monitoring. Humans are capable of being consistently and obliviously inaccurate in their assessments of the world and themselves, particularly if they subscribe to "naïve realism," defined by Lilienfeld et al. (2013) as "the erroneous belief that the external world is exactly as we see it" (p. 888). Lilienfeld et al. associated this tendency with a preference for clinical intuition, since to trust one's intuition is to believe it to have accurate communion with the outside world. It is clear the world is not simply as we see it and this applies to how psychologists monitor their own effectiveness and client progress. Lilienfeld et al. explained that

relying on clinical intuition or naïve realism to judge one's own effectiveness is to "misperceive change when it does not occur, or misinterpret it when it does" (p. 888). Of course, illusory correlation may also take up residence in this judgment if a client changes by the end of therapy but not necessarily *because* of therapy.

As has been commonplace throughout the history of medicine and psychiatry, clinicians wielding harmful treatments have often relied on their own judgments of effectiveness as primary evidence (even in the case of prefrontal lobotomy; Dawes, 1994). Lilienfeld et al. (2013) explored the various influences that can impact false or inaccurate judgments of effectiveness, what they termed "causes of spurious therapeutic effectiveness (CSTEs)" (p. 888), explaining that these are often in the "causal background" and thus less salient to practitioners and clients. The CSTEs they outlined included expectancy effects, spontaneous remission, regression to the mean, effort justification, and multiple treatment interference. Along similar lines, mental health professionals consistently overestimate rates of client improvement versus deterioration when compared with client outcome literature (Walfish et al., 2012).

Similarly, Walfish et al. (2012) reported that their survey of mental health professionals saw the average rating of skill at the 80th percentile, with no respondents (of the 129 surveyed) indicating self-rated skill below the 50th percentile. This tendency to overestimate one's ability is not unique to mental health professionals (Meichenbaum & Lilienfeld, 2018).

Thankfully, the risk of overestimating one's abilities and misinterpreting client change can be mitigated by SIP. To start, a strong knowledge base can help, such as relying on RCTs and other safeguarded research designs to clarify reasons for treatment success (Lilienfeld et al., 2013). Lee and Hunsley (2015) acknowledged that though it is tempting to rely on anecdotal evidence instead of more distant-seeming RCTs and meta-analyses, that "without the controls

afforded by scientific practices and scientific thinking, unsystematic clinical observations can lead to erroneous conclusions about the value of a clinical procedure" (p. 536). The other most popular mitigating suggestion is routine and data-driven monitoring of client functioning and progress (e.g., Dozois, 2013; Dozois et al., 2014; Hunsley, 2007; Laska et al., 2014; Tasca et al., 2019), effectively a SIP *behaviour*. Such monitoring allows for the demonstration of effectiveness (or not) through more than just client or therapist testimony (Bieschke et al., 2004). Essentially, seeking sound and systematic feedback throughout treatment should help correct psychologists' natural tendencies to overestimate themselves. Progress monitoring also enables psychologists to change course when clients are not getting better (Tasca et al., 2019), but this needs to be informed by research on the factors most likely to effect treatment success (Beck et al., 2014).

In the Canadian context, the CPA appointed a task force to explore effectiveness monitoring and to make recommendations (Tasca et al., 2019). This task force strongly recommended both progress monitoring (measurement and feedback throughout treatment) and outcome monitoring (pre- and post-therapy measures of functioning or wellness), for the same reasons outlined here. Alongside a clear suggestion that effectiveness monitoring imperatives be made stronger in the CPA *Code of Ethics*, Tasca et al. provided myriad resources to make this monitoring more accessible.

Upon reviewing the large body of evidence on what makes a successful therapy, Wampold and Imel (2015) concluded that if therapists are not engaging in systematic effectiveness monitoring, then they are not providing ethical care or practicing in line with minimum standards. Finally, mention of the ethical imperative of activity monitoring is brief but present in the CPA (2017) *Code of Ethics* (Standards II.22 and IV.8).

Wider Rationale Revisited

Counselling psychology has its roots in a scientific tradition (Cautin & Baker, 2014), with scholars and psychologists repeatedly reaffirming their commitment to psychological science and a scientific foundation (Vespia & Sauer, 2006). The beneficial place of science in CP is supported by a great deal of research and scholarship (e.g., Lilienfeld et al., 2015a; Wampold & Imel, 2015). Considering the error-prone nature of human cognition and the problematic consequences that may come from that nature (Garb & Boyle, 2015), as well as the evolving state of research (Neimeyer et al., 2014), SIP can better protect and benefit clients while robustly sustaining and enhancing the field. Ethically speaking, components of SIP are present in the CPA (2017) *Canadian Code of Ethics for Psychologists*, including a defined professional foundation in psychological knowledge, maintaining competence and remaining abreast of research, imperatives toward proper use of psychological knowledge, using the best available evidence in treatment decisions, reducing bias, and more.

The State of Science-Informed Practice in Professional Psychology

Considering the wide variety of reasons for SIP in CP, the degree to which such practices are taking place is of utmost importance. In other words, are the practices of Canadian psychologists actually informed by science? And, to what extent? There is little literature to support a definitive (or even moderately confident conjectural) answer to this question, but international literature as well as a review of the Canadian context as it pertains to supporting SIP provides some information. First, I define and explore the notion of the scientist-practitioner gap.

The Scientist-Practitioner Gap

When exploring the degree to which science informs practice in professional psychology,

the “scientist-practitioner gap” (SP gap) is most often referenced. The SP gap is seen as a divide between available research and actual professional practices carried out in the field. It has also been a concern since the advent of the profession (Vespia & Sauer, 2006). Indeed, Shakow’s purpose in the 1940s was not just to ground professional psychology in standardized science-based training, but to marry the important components of being both a scientist and a practitioner (APA, Committee on Training in Clinical Psychology, 1947). Many have worried that such hopes have not come to fruition. Although there have been concerns about an overemphasis on science in training at a cost to proficiency in practice (Cautin & Baker, 2014), more have expressed concern about a failure to produce adequate science-based practitioners (e.g., Baker et al., 2008; Holmes et al., 2018; Lilienfeld et al., 2013; Washburn et al., 2019).

Cautin (2011) grounded the SP gap in a historical disagreement about the primary foundation of psychotherapy: empiricism or clinical judgment and intuition. Tavris (2015) has clarified that this really is not a gap at all but a war between epistemologies. Namely, from psychology’s beginning, psychoanalysis and empirical psychology have been in conflict regarding truth and science and what constitutes legitimate evidence. This debate, as reviewed above, carries on today.

Many scholars have cited a wide variety of reasons for a gap between science and practice, including little contact and collaboration between scientists and practitioners (Hays et al., 2019; Holmes et al., 2018), inadequate training in science and research (Beidas & Kendall, 2010), insufficient modelling by professors during graduate training (Overholser, 2019), incompatible personality traits and attitudes (Gelso et al., 2013), and logistical barriers to keeping up with research and translating it into practice (Lilienfeld et al., 2013). Tavris (2015) explains the gap as a result of both a failure of some to stay up to date on current research, and of

others who uncritically adopt new unvetted fads and ideas. The SP gap has also been blamed on an overemphasis on positivism (e.g., Chwalisz, 2003). However, Wampold (2003) questioned the veracity of that claim, suggesting there is little proof that the SP model has failed in the first place, particularly since what the SP model was intended to do, exactly, has never been sufficiently clarified. Others have claimed that the SP gap might not be as bad as many think (Bartlett & Francis-Smythe, 2016), and that an emphasis on differences between scientists and practitioners has fueled a false dichotomy between the two (Bartholomew et al., 2017).

International Research on the Scientist-Practitioner Gap

Regarding empirical findings on the SP gap, I found 19 articles of reasonable relevance to the SP gap in the international context, limited to the last 20 years and to professionally similar countries. Most of these articles represent studies with American respondents, sometimes with Canadians included but in such small number to not be able to attest to the Canadian context reliably. Of these 19 articles, five were particularly relevant or similar to the research I have undertaken, and those are reviewed last.

In general, a handful of studies have investigated the extent to which research is relied upon in treatment or practice, as compared to other influences. For example, Stewart and Chambless (2007) surveyed 591 American private practice doctoral-level psychologists. Past clinical experiences had the most influence on treatment decisions, significantly more than research. Further, clinicians only “mildly” agreed (on average) that research on treatment outcomes had practical meaning and influence. Similarly, in a more recent study of 25 doctoral-level psychologists, Stewart et al. (2018) found that most psychologists did not rely on research evidence to inform diagnosis or treatment decisions. Based on their conversations with these clinicians, Stewart et al. ascertained that clinicians did not fail to utilise research because of

access or logistical issues but because they did not see research as holding clinical utility as compared to experience or intuition.

Similarly, in a large survey of psychotherapists (only 17% of whom were psychologists, and a fraction of whom were Canadian), Cook et al. (2009) found a predominant reliance on personal sources of information to justify therapeutic choice. Namely, most clinicians based their treatment decisions on colleague recommendations, guidance from mentors, previous graduate training, personal experience (including enjoyment of the therapy), client preference, books read, and likeness to one's previous approach. These clinicians weighed these sources of justification higher than "impersonal" (and empirical) sources such as journal articles, treatment manuals, institutional requirements, or organizational recommendations.

Through a survey with 736 British therapists (only some of whom were psychologists), Gyani et al. (2014) found that research played a small role in clinical decision-making and theoretical orientation since clinicians were more likely to rely on intuition, training, and clinical and personal therapy experience. In follow-up interviews with 33 British psychological therapists (some psychologists), Gyani et al. (2015) found that therapists based treatment choices on non-scientific sources, such as clinical and patient experiences. Therapists attested to the greater usefulness of theoretical and practical information over empirical research, finding RCTs unrepresentative, and outcome measures and manuals too rigid.

A larger handful of studies attested more to clinician attitudes to EBP or similar. For example, Wilson et al. (2009) conducted interviews with 21 American clinical and counselling psychologists, finding that while psychologists were open to EBP, they were unclear about the definition and initially mistook EBP for ESTs. Notably, psychologists reported that their attitudes toward EBP became increasingly positive during the interviews as EBP became clearer.

In their study, Safran et al. (2011) discovered that even among 123 research-involved doctoral psychologists (some Canadian), client work, supervision, and consultation were rated as more helpful than research publications. Still, over 90% of their sample indicated psychotherapy research to be helpful or somewhat helpful (although only 39% strongly agreed that it had had a significant impact on their practice).

Stewart, Chambless, and Baron's (2012) survey of 1,261 American doctoral-level psychologists in private practice found that clinicians were not as resistant to ESTs as is often claimed in the literature. In fact, on average, clinicians moderately agreed with the importance of staying abreast of the literature and incorporating scientific findings into practice. The biggest reported barriers to seeking training in ESTs were logistical (time and money) as opposed to empirical or theoretical. On the other hand, having more favorable attitudes toward ESTs was associated with having had graduate training with a research emphasis and with fewer years having elapsed since training. Regardless, many psychologists endorsed clinical experience to be more important than research.

In interviews with 25 American doctoral-level counselling and clinical psychologists, Stewart, Stirman, and Chambless (2012) found psychologists to have skeptical attitudes toward research despite these attitudes falling pray to myths (e.g., RCTs as non-representative) and running counter to robust research findings. Respondents also expressed confidence in their abilities to assess client improvement without the need for objective monitoring. Still, these psychologists were open to new information and valued knowledge about effective therapies; they simply disliked when ESTs were rigid or forced, versus being simply anti-EBP.

In a narrower study, 108 American psychologists were compared to 688 social workers and 69 marriage and family therapists, finding EBP attitudes to be similar amongst the groups,

but higher self-efficacy amongst psychologists, likely because of more extensive training (Parrish & Rubin, 2012). Moreover, with a small to moderate effect, PhD-level psychologists held stronger EBP orientations than master's-level social workers. In a more experimental study with 236 American doctoral-level psychologists, Kazantzis et al. (2017) found that those with positive EBP attitudes were more likely to persevere in recommending evidence-based treatment when clients showed reluctance (in this case, to exposure treatment).

Regarding science-based practice knowledge, Zhou et al. (2021) found that despite 200 American and Canadian doctoral-level psychologists having minimal self-reported sleep training, they rated themselves as prepared to evaluate and treat sleep disorders and made treatment recommendations out of step with evidence-based best practices. Similarly, Moses et al. (2020) found that 102 Australian psychologists reported only partially using evidence-based assessment practices for anxiety disorders, despite 86.3% of respondents saying evidence-based assessment was important or very important.

Exploring attitudes about science and pseudoscience, a large Australian study (n = 240) compared 134 professional (or clinical practice focused) psychologists to 106 academic psychologists. Half of the academic psychologists were engaged in clinical practice, but all worked in a post-secondary institution, generally as lecturers or professors. In this study, Ligorio and Lyons (2019) found that professional psychologists had more positive attitudes toward the personal use of complementary and alternative clinical approaches (many of which are of dubious scientific quality) and were more open to training in them and providing them, as compared to academic psychologists. Academic psychologists were both more critical of, and more concerned about the risks associated with, complementary and alternative practices, and demonstrated greater preference for rigorous testing prior to their use in practice. Although

correlational, this study suggests that research-oriented psychologists are more skeptical and science-based in their approach to "alternative" treatments than are practicing psychologists.

In a meaningful shift toward assessment of therapists versus mere self-report (and, thus, more in line with my own research approach), Gaudiano et al. (2011a, 2011b, 2012) have measured various critical thinking and related skills and dispositions. For example, Gaudiano et al. (2011a) assessed critical thinking, thinking styles (rational or intuitive), magical beliefs, and beliefs about complementary and alternative medicine, alongside the EBP attitudes and demographics of 143 licensed American psychotherapists (39% psychologists). Gaudiano et al. found that poorer critical thinking was associated with more magical beliefs, erroneous health beliefs, intuitive thinking style, and belief in alternative medicine. Interestingly, once attitudinal and dispositional factors were controlled for, demographic variables such as gender and education were no longer associated with critical thinking abilities.

Gaudiano et al.'s (2011b) study with 176 predominantly American psychotherapists (39% psychologists) demonstrated that a reliance on intuition was associated with a more negative attitude toward research, even after controlling for potential effects of other therapist factors. These researchers thus demonstrated an inverse relationship between intuition and EBP.

In their third study in this series, Gaudiano et al. (2012) investigated the differences between 149 psychotherapists, almost half of whom used Energy Meridian Techniques (EMT), a cluster of unscientific interventions not supported by research. Gaudiano et al. found that EMT users were more likely to possess a non-doctoral degree, to endorse a more eclectic approach to therapy, to rely more on personal intuition in decision-making, to have magical health beliefs, and to be more favorable toward alternative health approaches. Finally, the EMT users scored lower on measures of critical thinking than did the non-EMT users.

Interestingly, Gaudiano et al.'s (2012) study found that EMT and non-EMT users had similar attitudes toward EBP. Gaudiano et al. interpreted this largely to be a sign that the pseudoscience employed by the EMT movement was convincing to its users likely due to their lower critical thinking. In other words, this outcome could be interpreted to demonstrate that EMT users were less scientifically literate and thus less able to critically evaluate EMT, thinking these techniques *were* evidence based. An important implication of this finding is that clinicians may feel positively toward EBP and even believe they are engaging in it, while engaged in pseudoscientific practices. Gaudiano et al. suggested that this finding demonstrated the need to teach clinicians what *not* to do as well as what *to* do. It also demonstrates the importance of going beyond mere self-reported adherence to and attitudes about science and research.

Along the same research lines, Sharp et al. (2008) were the first researchers to assess critical thinking skills among 79 therapists (predominantly doctoral-level psychologists), finding (although more tentatively) that higher critical thinking skills were related to lower use of pseudoscientific therapies and to having graduated from a scientist-practitioner program. More recently, Seligman et al. (2016) assessed the social cognitive traits (e.g., need for cognition, intuitive thinking styles, and career interests) of 434 therapists, most of whom were licensed doctoral-level clinicians. Seligman et al. found that more intuitive decision-making was associated with lower need for cognition and less favourable EST attitudes. Likewise, respondents who were researchers tended to be more favourable toward ESTs. However, clinicians with a higher need for cognition and lower reliance on intuition favoured ESTs at a rate matching the researchers in the sample.

Overall, international research supports an SP gap, even when clinicians report favourable attitudes toward science and research and confidence in their own competence.

Training in Science-Informed Practice

To add understanding to SIP, some studies have evaluated training in the SP model and EBP as well as student factors that may interact with such training. These studies are relevant to my research as they indicate the likelihood of psychologists being sufficiently prepared to be functioning scientist-practitioners. I found nine studies of legitimate relevance to the subject area of science-informed training, some Canadian and some otherwise, all of which are reviewed below. Several other theoretical and review articles are also covered.

In a 2010 article, Peluso et al. detailed their findings with 134 Canadian clinical psychology graduate students who claimed their programs leaned more toward research training (than practice) and indicated satisfaction with the quality and amount of science training they received. Similarly, in VanderVeen et al.'s (2012) survey of 653 clinical psychology graduate doctoral students (mostly American, but some Canadian), students said they were confident in their ability to integrate science into practice because of their training. However, a third of the students reported rarely using science-based approaches to client care. Specifically, while more than half used some kind of objective measures in diagnoses and treatment decisions, more than a third reported rarely or never engaging in other SIP activities such as consulting the literature prior to intervention, informing clients of treatment options and research findings, or encouraging research-informed client decision-making.

Notably, students in VanderVeen et al.'s (2012) survey came from programs with research/practice training ratings (specifically program self-ratings compiled by *Insider's Guide to Graduate Programs in Clinical and Counseling Psychology*), almost all of which were rated as either equally balancing research and practice or leaning predominantly toward research training. Plus, 92% reported moderate to strong beliefs that SP training would influence their

career. As it turns out, despite the low integration noted above, half of the students surveyed from these programs considered themselves above average in their science-practice integration, and 19.4% considered their integration abilities excellent. Only 2% rated themselves as below average, reminding us of the Walfish et al. (2012) findings of inflated self-ratings.

Green et al. (2018) surveyed 237 Australian graduate psychology students attending practice-focused master's and doctoral programs as well as research-only doctoral programs. Green et al. found that doctoral-level students placed more intrinsic value on research skills than did master's students. Master's students saw communication as more important than both theory and research, with research skills ranked as least useful and as not important to develop. The research-focused students were the only group that ranked the three skill areas as equally valuable, but all students reported the least self-efficacy in research skills as compared to the other two skill areas.

Similarly, in Luebbe et al.'s (2007) study with 1,195 graduate students in SP programs (41 American and 3 Canadian; almost entirely doctoral level), few students were able to accurately define EBP (as defined by the APA). However, 81.1% of students included the research leg of EBP, although 18% indicated an understanding of EBP as synonymous with ESTs. In terms of their exposure, students reported hearing about EBP most often in class settings as compared to practicums/internships. On average, students indicated EBP as influencing their practice "a little to somewhat," but 71.2% indicated agreeing with the principles of EBP. Furthermore, research-oriented students endorsed EBP principles more than did clinically focused students. Students with a research focus or a focus balanced between research and practice were more likely to consult RCTs and systematic reviews than were clinically focused students who reported heavier reliance on client preferences. With their findings, Luebbe

et al. reported support for the SP gap.

Constantino et al. (2017) also found that despite Canadian and American doctoral-level training directors being aware of the therapeutic alliance as a component of EBP, they largely reported no systematic training in its regard. Similarly, a survey of Canadian and American professional psychology doctoral internship directors found that most reported not using progress monitoring measures, with a significant number never having even heard of them (Overington et al., 2016). Specifically, of the 35 Canadian directors surveyed, 60% reported not using progress monitoring measures at their internship site, and an additional 20% reported only having previously used them (but not currently). Similarly, Madsen et al. (2021) found that of the 18 Canadian CPA-accredited training program directors they surveyed, only seven (38.9%) reported systems for providing routine outcome monitoring data to students from clients, and no official incorporation of that data into supervision.

Taken together, some students report satisfaction with their science training, and many endorse a scientific approach. However, science-practice integration seems suspect, and robust training in EBP is not a given. Indeed, Holmes et al. (2018) reported that a paucity of basic research is taught in clinical mental health programs internationally, particularly at the master's level and in PsyD programs (as opposed to PhD). As such, Holmes et al. questioned the degree to which clinicians could be science-informed without this training. If untrained in SIP, there should be no realistic expectation of a science-based profession.

Training Components and Mechanisms. Creating science-informed psychologists is no simple feat. Despite the urging of Shakow's committee (APA, Committee on Training in Clinical Psychology, 1947), little research exists on the matter. Gelso et al. (2013) reviewed the literature demonstrating significant ambivalence about research among students, and thus the role of

graduate training in nurturing them away or toward research. Gelso et al. outlined a variety of important training components that can enhance research self-efficacy, motivation, and production. With the research to date, emphasizing the social aspects of research training for psychologists seems the most impactful, but other elements such as positive mentor/student relationships, research training prior to graduate school, and training in diverse research also seem important.

Likewise, Apostolopoulou and Skourteli (2015) found that motivation was the largest predictor of psychologists' scholarly activity, and they argued for the importance of engaging students in scholarship during graduate school in a way that would increase such motivation. Some scholars have advocated for *doing* research during graduate training to truly learn about the scientific method (rather than just taking courses in research methodology; e.g., Hiebert & Uhlemann, 1993). However, other research has demonstrated that, at least at the undergraduate level, research knowledge and skills were more influenced by formal training than by completing a research project (Balloo et al., 2016). Balloo et al. also found that despite two years of undergraduate training in research methods, knowledge was not retained at the end of studies, suggesting that this amount of training was insufficient for significant long-term changes in understanding. These researchers found that it was student differences, such as motivation, metacognitive abilities, conscientiousness, research interest, and self-efficacy, that were positively associated with gains in research knowledge.

Importantly, Gelso et al. (2013) have asserted that what appears to matter *most*, according to the literature, is who the student is well before training, suggesting that personality or relatively stable characteristics may largely determine competency. Other literature has supported the relationship between the "person" of the psychologist (or who they "are") and their

effectiveness (Halinski, 2009; Heinonen et al., 2014; Jennings & Skovholt, 1999; Pope & Kline, 1999). Since at least some of these qualities cannot be expected to be modified significantly by graduate training, particularly if only two years in duration, many scholars have argued for stronger gatekeeping during admissions to select for students with necessary foundational qualities (e.g., Gower & Harris, 2020; Homrich, 2009; McCaughan & Hill, 2015).

Gatekeeping should also be considered regarding scientific competency. Garb and Boyle (2015) have argued that admissions for graduate programs in professional psychology must select for scientifically minded students. Overholser (2010) has suggested that while programs say they adhere to an SP approach, this approach may be downplayed by faculty not wanting to scare away more relationally oriented (and science-ambivalent) students. In other words, the admissions practices of graduate programs likely impact the degree to which psychologists are science-informed or can be nurtured to be. Also of note is the finding that among VanderVeen et al.'s (2012) 653 graduate student respondents, the longer they were enrolled in the program, the more their interest in research waned.

As another training complication, Ridley and Laird (2015) have emphasised the there is no clear definition or operationalization of the SP model despite how rampantly it is referenced and lauded. They have suggested that without "a clear consensus on the nature and means of implementation of the scientist-practitioner model, its practical utility for the field will likely remain powerful in reputation but ultimately vacuous" (p. 237). Since it is not difficult to find the model endorsed but perhaps not embodied, others have wondered about "the degree to which counselling psychology's rhetoric [has] matched its actions" (Vespia & Sauer, 2006, p. 241). According to Gelso (2006), SP training efforts have not been systematic and have shown little planfulness regarding training details. Considering the lack of theory about and research on

training, it is no surprise that the scientific imperative for psychologists might be more an idea or hope than a reality.

To find out more about the embodiment of the model, Ridley and Laird (2015) surveyed 32 leaders involved with the Council of Counseling Psychology Training Programs, predominantly as directors of APA-accredited American doctoral programs. Ridley and Laird described their results as "puzzling at the best and disconcerting at the worst" (p. 251), due to the lack of consistency in defining the SP training model and its important components and mechanisms. Furthermore, they reported that none of the directors surveyed reported any manner of evaluating the effectiveness of their training programs in this regard. As an implication, the SP model was observed to lack clarity and purposeful (and monitored) implementation.

Finally, of the more scathing critiques, Baker et al. (2008) expressed little confidence in the scientific rigour of the professional psychology field, citing professional programs as one cause of this ill. Baker et al. stated that American PsyD programs, which are practice-focused and vary widely in their quality of and emphasis on training in science, produce 40% of clinical and counselling psychology graduates (despite only comprising 20% of the accredited programs, at the time). These scholars do not think there is reason to believe that practice is robustly informed by science. Although PsyD programs are not as popular in Canada, terminal master's programs are popular and resemble PsyDs in some ways (although with even less training).

The Scientist-Practitioner Gap in the Canadian Context

In the Canadian context, little research exists about the use of EBP among practitioners (Fitzpatrick et al., 2015). Fitzpatrick et al. suggested that while EBP is a core Canadian counselling psychology value, its actual practice is less certain. In terms of primary research articles, Hiebert and Uhlemann (1993) are credited with the first study investigating the identity

of Canadian counselling psychologists, although their final participant number was low (n = 16). In terms of science-based practice, Hiebert and Uhlemann found that counselling psychologists saw themselves as operating from a more scientific and research-oriented foundation than they perceived for counsellors. Likewise, Bedi et al.'s (2016) small study (n = 79) found that counselling psychologists valued using research to inform practice to a relatively high degree (M = 4.26 on a 5-point Likert scale). Of course, these are simply studies of self-reported identity and indicate more about attitudes than about competence. Otherwise, I review nine studies that have some bearing on SIP among Canadian clinicians.

As a bridge between training and practice, Beaulieu et al. (2020) examined the list of continuing education options officially advertised to Québec psychologists and accredited by the Québec regulatory college. Despite the college's accreditation criteria including evidence for treatment, almost half of the therapy trainings offered to Québec psychologists were not research supported. Beaulieu et al. concluded that this reflected poorly on the regulatory body's accreditation process. They also indicated diminished faith in the robustness of EBP in the province considering the examples set by the college and by the trainers involved in these unsupported trainings, as well as the number of psychologists enrolled in such trainings and subsequently delivering such services. Furthermore, some of the advertised trainings claimed an evidence base that did not bear out upon investigation, indicating a possible misunderstanding of EBP or else duplicitousness. (As an interesting aside, Québec's regulatory body has endorsed the APA EBP (2006) standards but not the CPA ones.)

In a Calgary-based study of 52 mental health workers (almost half of whom were psychologists) working with clients with eating disorders, von Ranson and Robinson (2006) explored the types of treatments used and their rationales. von Ranson and Robinson found that

most clinicians used cognitive behaviour therapy (CBT) as their primary approach (59.6%) or CBT techniques even if CBT was not their primary approach. However, few were trained in manualized CBT and those who were trained could not recall the author of the manual. Clinicians most frequently reported having chosen their primary approach based upon clinical experience. Other reasons included research support or a match with one's theoretical orientation. von Ranson and Robinson also found differences for the reasons given for choice of approach based on the approach type, with CBT users most often citing research support, addiction-based and Interpersonal Therapy users most often citing clinical experience, and eclectic clinicians most often citing flexibility. Certain approaches (addiction-based and EMDR) were also more likely to be endorsed based on one's own personal recovery experience. In all, von Ranson and Robinson asserted little confidence in the use of EBP in this sample, especially due to the reliance on personal judgment for choosing treatments and because of the common use of non-research supported eating disorder treatments. In a follow-up study, von Ranson et al. (2013) sought to expand the reach and generalizability of their previous study, this time surveying more clinicians across the province of Alberta (n = 118; almost half psychologists). Again, they concluded that the eating disorder treatment provided by most clinicians in the sample was not evidence-based.

Although not as recent, Legault and Laurence (2007) surveyed 220 Québec mental health professionals (35% psychologists; otherwise, social workers and psychiatrists) about their clinical experiences with "recovered" memories and their knowledge about memory in general. At the time, 41% of psychologists agreed that hypnosis enabled accurate remembering of forgotten events (67% as far back as birth) and 27% rated recovered memories as reliable. In general, psychiatrists performed better in terms of beliefs and expertise as compared to

psychologists, who themselves performed better than social workers. Overall, psychologists endorsed a substantial amount of pseudoscientific and false beliefs related to memory.

Czincz and Romano's (2013) study investigated the extent to which Ontario psychologists who were working with children and adolescent survivors of sexual abuse were engaged in EBP. Of the 231 psychologists surveyed, 77.5% had no training in specific treatments for child sexual abuse, and 66.2% reported never receiving supervision in this work. These scholars found that psychologists who reported using the treatment with the best empirical support (trauma-focused CBT) tended to be younger, have a CBT orientation, and engage in ongoing continuing education activities.

Along similar lines, Eichstedt et al. (2014) surveyed 79 psychologists and psychiatrists (split nearly evenly) from 56 hospitals and mental health agencies in Ontario, seeking information about treatment provided for childhood anxiety. Overall, EBP was reported to be underprovided and underutilized in these settings. Briefly, in their analysis of survey results from 63 Canadian psychotherapists (many psychologists), using the Theory of Planned Behaviour, Tasca et al. (2014) reported that practitioners' attitudes were the largest contributor to intentions to use research (followed by subjective norms and perceived behavioural control).

Ionita and Fitzpatrick (2014) surveyed 1,668 Canadian psychologists regarding their progress monitoring with clients. Results indicated that 67.4% of respondents were not familiar with progress monitoring (PM) measures, 14.5% were familiar but had never used them, 6.1% has previously used them, and 12.1% were using them when surveyed. Differences between psychologists were found in terms of awareness and use of PM measures including years since graduation (with more years correlated to being less aware), education type (with doctoral and post-doctoral graduates both more likely to be aware and to use PM measures), and professional

activities (with greater awareness among those involved in research, teaching, supervision, and administration, but with lower use among those involved in supervision and administration than in other activities). Practitioners with an eclectic theoretical orientation were also more likely to endorse using PM measures.

Finally, Middleton et al. (2020) attempted to investigate the understanding and practice of EBP across Canada, surveying 684 psychologists and psychotherapists. Québec was the most frequently represented with 42.0% of the sample, followed by Ontario at 19.3%. Other provinces and territories each comprised 9% or less of the sample. Middleton et al. translated the APA and CPA task force reports on EBP into survey items to assess the degree to which respondents endorsed various elements of EBP. They asked respondents to rate themselves on these components, the degree to which clinicians "should" engage in the various components, and the degree to which they perceived other clinicians to engage in the components of EBP. Most items related to considering various client factors in choosing interventions (characteristics, preferences, goals, background, etc.). Other items included progress/outcome monitoring, evaluating research, and research literacy. Respondents were also asked the degree to which they agreed with statements about EBP, such as the generalizability and applicability of ESTs and other research, the importance of EBP, and the accessibility of research literature. Finally, respondents ranked different research designs, and rated the extent to which they used and should use certain sources of evidence.

Middleton et al. (2020) found that, on average, clinicians rated their abilities to critically evaluate research reasonably highly (M = 76.65, out of 100). Clinicians agreed that they engaged in the various components of EBP, consistently rating themselves, on average, as falling above the 4-rating on a 5-point Likert scale, except regarding research design skills and

progress/outcome monitoring. Their agreement ratings for if they *should* engage in these practices were reasonably similar to their self-ratings, except in the case of progress/outcome monitoring and critically reviewing scientific literature which showed that they should be doing these things more than they did. Unsurprisingly, clinicians consistently rated themselves higher for the EBP components compared to their ratings for other clinicians (who they consistently rated in the 3 out of 5 range, apart from monitoring, which scored even lower, and attending to client goals which scored slightly above 4).

Regarding the evidence hierarchy, clinician ratings of various research designs in Middleton et al.'s (2020) study largely corresponded to the EBP task force hierarchy (Dozois et al., 2014). One notably low rating was for the degree to which respondents saw basic psychological science as significantly contributing to practice, which they ranked quite low compared to other research. Regarding knowledge sources, clinicians reported that they relied less on research studies, meta-analyses, and published expert consensus than they should. They also reported relying on both prior professional experience and personal opinion/clinical intuition to reasonably high degrees and more than they thought they should. In fact, the second (out of eight) highest rated source of knowledge for selecting treatments was prior professional experience. The fourth highest was personal opinion/clinical intuition. Middleton et al. (2020) interpreted their results overall as suggesting that clinicians have favorable attitudes toward EBP, are client-centred, and are engaged in the clinical expertise components of EBP. They ascertained that clinicians are either unaware of other colleagues' work or believe they haphazardly follow EBP tenets. They also suggested that clinicians still largely appeared to over-prioritize non-empirical sources of knowledge.

Taken together, the above research suggests that many Canadian psychologists perceive

themselves as engaging in EBP, especially when asked about their consideration of client factors. However, most of the available relevant literature suggests low engagement in science-based practice. Most notably, there are many areas of science-based practiced that have not been investigated at all (e.g., critical thinking).

The Wider Canadian Context

It is important to briefly consider the context of counselling psychology in Canada in order to frame expectations and realities around science-based practice. First, professional psychology is regulated at the provincial and territorial level, meaning that the legal mandate falls to 13 separate jurisdictions to regulate the profession (CPA, 2012). As a result, there is great variability in the regulation of professional psychology across Canada regarding title, training requirements, exams, and initial and ongoing licensing requirements (Dobson & Dobson, 2019).

There were reportedly 19,591 licensed psychologists in Canada in 2020 (Canadian Institute for Health Information, 2022), including clinical, counselling, and a wide variety of others (e.g., health psychologists, sports psychologists). However, there is no distinct registration more specific than the general title of psychologist, meaning that there is no clear accounting of the types of psychologists in Canada (Hunsley et al., 2013). Even if there was some system of accounting, counselling psychology is variably defined by different regulatory bodies (Beatch et al., 2009). Considering the non-existence of the title “counselling psychologist” in Québec (Bedi et al., 2012), for example, there are challenges delineating the profession of counselling psychology across Canada.

In terms of SIP, scholars claim that the science of psychology is “embedded in our codes of ethics, standards for professional conduct, and professional training accreditation criteria” (Drapeau & Hunsley, 2014, p. 145). Hartman et al. (2016) echoed this sentiment, claiming that

all psychologists are trained as scientists in Canada. And yet, several factors undermine these claims or at least the reality of what may be happening in practice.

First, regulatory and more aspirational documents claiming the scientific basis of professional psychology may have little actual influence on individual practitioners (Drapeau & Hunsley, 2014). The average psychologist would have to take it upon themselves to read and apply the CPA EBP task force report's recommendations (Dozois et al., 2014) which they may see as merely aspirational. Furthermore, upon examination, documents such as the CPA (2017) *Code of Ethics* suggest only vague, science-based imperatives. In fact, the code targets "scientists, practitioners, or scientist-practitioners" (p. 3), essentially making science optional. The code also makes regular mention of the "scientific and professional activities" of psychologists, as though these are separate. On closer reading, the CPA ethics code means *research* when they say "scientific activities," which might suggest to some that professional activities are not scientific (and, unfortunately, overly confounds research and science). While the ethics code mentions elements of SIP, it never does so very directly, and there is certainly no clear imperative to be science-based. Moreover, none of the changes were made to the *Code of Ethics* as recommended by the CPA EBP task force to strengthen EBP in Canada.

Drapeau and Hunsley (2014) asserted that "Simply put: the 'evidence' in EBP, and the 'science' that is referred to in all codes of ethics of psychologists, can frequently be little more than empty shells, devoid of any real meaning" (p. 146). These scholars and others (e.g., Forman et al., 2016) have explored how this sentiment is especially true when scientific imperatives are relegated to lofty documents but not translated into tangible and enforceable policy that truly alters individual practice. The fact that registration procedures in Canada neither match with nor seem to give preference to CPA accreditation also introduces a divide between aspirations and

actual requirements (Dobson & Dobson, 2019).

Another complication in Canada is with entry-to-practice training requirements, since six jurisdictions permit master's-level entry into the profession, and six require a doctorate (one jurisdiction has no regulation; CPA, 2023). This variability is despite the CPA (2012) recommendation of a doctoral minimum in order to have enough training in the requisite competencies for professional psychology practice, especially research and EBP. Thus, master's-level education is concerning since the likelihood of ample training in science and research literacy seems unlikely (e.g., Bedi et al., 2011; Holmes et al., 2018; Hunsley, 2007).

Moreover, there is considerable overlap in mental health professions in Canada, especially between counselling, counselling psychology, and clinical psychology (Bedi et al., 2016; Haverkamp et al., 2011; Young & Nicol, 2007). Some studies have shown that practitioners themselves see little differences between these professions, and consistently comment on the lack of distinct professional identity (e.g., Bedi et al., 2018a, 2018b; Gazzola & Smith, 2007; Pradhan & Bedi, 2019). Not only does this lack of distinct professional identity suggest that the claims about unique identity may not have much bearing, it also renders training less systematic (Domene & Bedi, 2013). Indeed, counselling psychology graduate degree programs have no obligation to offer any set curriculum and the adoption of the SP model varies across programs (Domene et al., 2015). Even CPA-accreditation, with some degree of SP endorsement, is voluntary and only at the doctoral level. Furthermore, only five counselling psychology doctoral programs in Canada are accredited, meaning that most counselling psychologists will not attend accredited programs (Bedi et al., 2016). And even if a program is accredited, it may not be implementing a robust curriculum that sufficiently prepares students for SIP (Fitzpatrick et al., 2015).

There is also a literal overlap in training and licensure in the Canadian context since a single master's-level program can lead a graduate to licensure in both counselling and counselling psychology. This overlap means that a student may train in a counselling-oriented program and yet become a psychologist, or train in a counselling psychology-oriented program and become a counsellor (Haverkamp et al., 2011). Pradhan and Bedi (2019) explained that this training and licensure overlap is unique to Canada (and not even permitted in every jurisdiction) and presents a unique challenge to professional identity and consistent standards of practice. As it is now, belonging to multiple professions is not uncommon, with some registered as psychologists and certified as counsellors simultaneously, and/or part of the CPA and the national counselling association, and/or with training and licensure in one but teaching in another (Haverkamp et al., 2011). Here, it is simply important to understand that dilution of professional identity indicates training that is more likely indistinct and lacking in purpose regarding foundational components such as science or psychology.

The Need for Research

In their review of the Canadian literature and training landscape, Beatch et al. (2009) determined that counselling psychology has a "central focus on psychological principles" (p. 30) and that they "expect that [counselling psychology] practitioners are employing evidence-based practice" (p. 31). Beatch et al. also reported that master's-level counselling psychologists are trained "to critically appreciate and integrate research into practice" (p. 47). Beatch et al.'s assertions were based primarily on regulatory and doctoral program documentation, on academic assertions of counselling psychology identity, and on limited feedback from predominantly doctoral-level and other unique (conference-going, CPA member) populations. Thus, these claims were not based in research that evaluated what most counselling psychologists actually

think and do. Rather, Bedi et al. (2012) indicated that Beatch et al.'s (2009) findings were suggestive and awaiting research support.

Furthermore, available research demonstrates that what is often conjectured about counselling psychology identity turns out not to be embodied by most counselling psychologists. For example, various studies have shown that psychologists or doctoral students do not value or have a practical focus in alleged "core" counselling psychology elements including career issues (Goodyear et al., 2016), prevention (Bedi et al., 2018b), social justice (Goodyear et al., 2016), or as is the focus here, a basic psychological science foundation (e.g., Middleton et al., 2020). At base, these findings mean that what is claimed about counselling psychology is not necessarily true. Plus, such scant research on counselling psychologist identity exists in Canada as to make claims largely speculative. Regarding SIP, even less is known (Fitzpatrick et al., 2015; Middleton et al., 2020).

This is a problem. We need to know about counselling psychologists (Pradhan & Bedi, 2019). A coherent identity informs professional boundaries and limits, clarifies training needs, and ultimately assists clients in the informed consent process (Sinacore, 2015; Young & Lalande, 2011). Knowing about psychologists is also part of being accountable and correcting professional failures or insufficiencies (Hartman et al., 2016). Fundamentally, knowing about ourselves is an ethical imperative of self-regulation. Self-regulation means protecting the public and fulfilling our mandate of ample training, robust entrance-requirements, and sound and accurate standards of practice (College of Alberta Psychologists, 2014). How can we regulate ourselves well if we do not even know about ourselves? How can we truly protect the public without basic knowledge of counselling psychology's actions, successes, and failures? Our profession extolls the necessity of progress and outcome monitoring with clients but needs to do

a much better job of monitoring itself, especially regarding the degree to which psychologists are informed by science (Haverkamp et al., 2011). If counselling psychology's scientific foundation is so important, we need to know if that imperative has been met (Hiebert & Uhlemann, 1993; Middleton et al., 2020). It is simply not enough to claim an identity; we must embody it and confirm it (Baker et al., 2008; Hartman et al., 2016).

Of course, that is not all. Beyond the argument for clarified identity and robust self-regulation, most importantly: science should improve practice. Without science, counselling psychology opens itself up to a plethora of harmful influences including unchecked cognitive biases, unsubstantiated and faddish therapies, blatant pseudoscience, dubious judgments of effectiveness, and an absence of basic scientific principles. On the other hand, with science, psychologists are better able to choose effective treatments, understand and monitor the myriad complexities that impact treatment, and think critically about what they are doing and why. With science, counselling psychology emphasizes its usefulness, reliability, and legitimacy. Unfortunately, there is substantial doubt and yet still insufficient information about the extent to which Canadian psychologists are robustly science-informed, marking a significant and concerning gap in the literature. Thus, we must measure the degree to which psychologists are truly and meaningfully informed by science. We must do this not only because we owe it to the public to self-regulate and because we owe it to our profession to flourish; we must measure the extent of our SIP because it is a basic ethical imperative that we work toward helping as best we can and harming as little as possible.

Research Purpose

The present study aimed to contribute to the literature on SIP in Canadian professional psychology. Specifically, this research intended to discover not only *if* psychologists identify

attitudinally with science but if they embody certain competencies. Furthermore, including essential demographics in my research was intended to help distinguish more and less science-informed clinicians.

Research Questions and Hypotheses

This research explored the following two research questions and six hypotheses:

Research Question 1: To what extent do clinicians endorse and embody a science-informed approach to practice?

Hypothesis 1: It was hypothesized that clinicians would have higher average scores for endorsing versus embodying science-informed practice (i.e., higher science-informed attitude than science-informed practice scores).

Hypothesis 2: It was hypothesized that clinicians would not, on average, score highly on the test of science-informed practice (i.e., show a left-skewed distribution), but would rather show a right-skewed or normal distribution.

Research Question 2: What are the relationships between clinician characteristics (e.g., demographics, training, licensure) and embodiment of science-informed practice?

Hypothesis 3: It was hypothesized that training type would predict outcomes on a science-informed practice test such that psychologists trained in clinical programs would outperform those trained in counselling psychology programs who would, in turn, outperform those trained in counselling programs.

Hypothesis 4: It was hypothesized that training level would predict science-informed practice scores such that clinicians with doctoral degrees would outperform clinicians with master's degrees.

Hypothesis 5: It was hypothesized that engagement in more science training (formal or

self-study) would predict higher science-informed practice test scores.

Hypothesis 6: It was hypothesized that licensure type would predict science-informed practice scores such that psychologists would outperform counsellors.

The Role of the Researcher

Trustworthiness and credibility considerations are chiefly considered in qualitative research, assuming validity in quantitative studies is otherwise accounted for (Onwuegbuzie & Collins, 2007). However, I continue to believe that my position as the researcher matters to this study and so I choose to reveal my own biases and journey to this research, largely for context, and partly for credibility. Perhaps, too, this can serve as a partial response to my reader's potential skepticism about the purpose and meaning behind the research, or else arm the unsuspecting reader with some fair skepticism about my intentions and biases.

I was significantly won over by pseudoscience about 14 years ago because I was easy prey in two major ways: I had some degree of desperation, and I was scientifically ill-equipped. In essence, having unmet physical health and mental health needs made me vulnerable to the over-confidence (and genuine care) doled out to me by alternative medicine practitioners, including naturopaths, unlicensed nutritionists, and mental health counsellors. One naturopath selected a supplement for me based on how tightly I held my forefinger and thumb together while holding the supplements in question. I read books that convinced me I needed to stop consuming gluten and milk. Another naturopath had me drink daily cinnamon tinctures. Most confoundingly, I had a round of psychotherapy that I still believe had a curative impact because of its therapeutic elements, but with decidedly pseudoscientific ingredients mixed in (e.g., energy work, dream analysis, baseless somatic work). Thus, I believe I understand what it is like to be under the spell of bad science in a way that should lend insight and sensitivity to this study,

particularly because I know my engagement in pseudoscience was well-intentioned and earnest.

I also went to graduate school in counselling psychology firmly believing in therapy as a healing process that I could assist in by nature of my personal qualities and wisdom alone. I did not care much for the involvement of science. But, when I decided to change graduate schools, I had to upgrade my undergraduate courses. This sent me to a university with a strong focus on debunking pseudoscience, where I was slowly disabused of many of my previous misunderstandings. Still, as is reflected in my master's research on the place of personal qualities in graduate admissions for counselling programs, I have generally put more stock in the person of the therapist than in their training or degree of scientific know-how (not that these are mutually exclusive). However, during my master's research, I *did* develop as a scientist-practitioner, and in addition to engaging increasingly in science-based media, I changed.

Now, I see the harms of pseudoscience both in general and in our profession. I feel defensive of our profession and its legitimacy, and I am motivated to protect it through my research—an important bias to monitor. I am also protective of clients who are naturally vulnerable in treatment relationships, meaning I often focus more on public protection than professional advancement—another bias I monitor frequently for the impact it can have. Even more to the point, this research highlights a central dilemma: I came to this profession for different reasons and with a different rationale than what often drives me now. Yet, these two "parts" are both still present and largely in tension. Truly, this research is part of my attempt to reconcile my struggle to be a scientist in a profession where my own foundation feels decidedly unscientific. Currently, I do not think there are easy answers to my questions about how to practice, but I do think that there are minimum standards that are necessary and reachable. Thus, I have an essential bias toward scientific thinking and practice, but I do not have certainty in this

as an easy application or straightforward path, especially in a profession that really must value wisdom, whatever that is (and may we better measure it and find out). I also do not pretend to know *exactly* how science should inform practice and what that precisely looks like in every iteration.

Chapter 2: Methodology and Methods

In this chapter, I explore the underlying methodological approach to knowledge as well as the specific methods for this study. The approach to science and its impacts on methodology and methods will correspond to the philosophy of science exploration in the previous chapter.

Methodology

Before exploring the specific methods of this proposed study, the wider methodology and philosophical assumptions will be explored. Methodology and methods are often confused, or the terms are used interchangeably, but in keeping with an explicit approach to critical inquiry, it is important to separate them. As explained by Onwuegbuzie and Poth (2016), "methodology can be defined as a broad approach to scientific inquiry with general preferences for certain types of designs, sampling logic, analytical strategies, and so forth" (p. 6). Thus, methodology is not synonymous with specific choices of methods or specific techniques chosen in data collection or analysis. Rather, it has "more to do with how well we *argue* from the analyses of our data to draw and defend our conclusions" (6 & Bellamy, 2012, p. 11). This statement is reminiscent of the broader definition of science as *critical inquiry* by scholars such as Petocz (2011) and Maree (2019), signalling a knowledge-seeking approach grounded in whatever allows for the most warranted inferences, with specific attention to threats to such inferences (6 & Bellamy, 2012).

Philosophical Assumptions

The researcher's paradigm or worldview and theoretical lens are a set of assumptions and approaches that ultimately inform methodology and subsequent methods. Creswell and Plano Clark (2018) have argued for the importance of making such approaches explicit, especially in graduate research. Out of respect for the actual depth required to understand approaches to knowledge creation and philosophy of science, I offer tentative and brief positions on these

matters.

Within the broadest view of science as *critical inquiry*, I adopt a realist approach. Maree (2019) explained that realism holds that reality exists separately from the human mind (in opposition to a constructionist view), and that even if something is not observable, it is still real. Realism also assumes that reality can be studied scientifically, regardless of the nature of that reality (i.e., natural or social). As previously explored, this approach to scientific inquiry does not prioritize a certain method. Indeed, this view sees science as "the endeavour to find things out…in a critical manner appropriate to its phenomena" (p. 4).

In practice, realism informs this research in two major ways. First, I have believed that certain things can be found out, even if difficult to observe. Instead of thinking that what drives the counselling process (such as wisdom or warmth) is overly unmeasurable, I have believed that some objective and knowable truths govern success and failures in therapy and that with the right science we can measure and determine such things. And even if not perfectly, then at least better. I do not succumb to a sense of overwhelm at the thought of trying to measure the counselling process (although I feel it). I have, instead, a sense that we must carry on at better understanding the reality that does indeed exist separately from the human mind and governs, in all its complexity, the path by which people heal or not. These positions have influenced my approach to this research and my engagement in the topic in the first place.

Second, a realist foundation in this research means I have endeavoured to find something out *objectively*. If I believed that truth was subjective or merely constructed, there might be little point in science-based practice or in trying to measure SIP among clinicians. There would be no truth or best practices; client wishes and self-perceived successes would suffice; clinician idiosyncrasies would be less concerning; claims of placebo effects (or expectancy effects or

faith-in-treatment) would be enough to satisfy attempts at robust practice. But this is not my bias. Instead, I believe that we can find out increasingly objective truths about psychologists and about professional psychology. Through this process, I believe we can be better.

Relatedly, there is somewhat of a pragmatist worldview at play here, which I see as connected to critical inquiry insofar as the choices of methods must correspond simply to what is pragmatically sought to be known. As explored by Cherryholmes (1992), the pragmatism I mean is that which encourages actionable problem-solving quests considering the consequences of some phenomenon (such as the consequences of how we train and practice professional psychology). Or, as Creswell and Plano Clark (2018) outlined: epistemologically, pragmatism does "what works" (p. 38). I had questions for Canadian clinicians, and I sought to ask them pragmatically. I did not ask these questions perfectly, and the knowledge I have produced is flawed and inadequate to my ultimate endeavour (i.e., to determine the extent of SIP in Canadian professional psychology). Balancing rigour with pragmatically continuing an important line of inquiry was a central challenge of this research. Fundamentally, the pragmatic approach gets its best justification from how (direly) under-researched this topic is in Canada. In other words, this research attempts to advance the field, pragmatically speaking, despite its flaws.

Survey Method Approach

The rationale for the survey design was to gather information about the science-informed practice (SIP) of Canadian psychologists and their close colleagues (i.e., counsellors). In the first place, few studies currently attest to SIP among Canadian psychologists. Of the extant studies, many are narrow in their exploration (e.g., Czincz & Romano, 2013; von Ranson et al., 2013). Middleton et al.'s (2020) study, while much more generalized, relied heavily on self-report, and largely focused on comparing between clinicians and psychology leaders as opposed to among

clinicians themselves. It also focused on client preferences and characteristics to a large degree and did not provide information about most of the core aspects of SIP as explored in this study's literature review. As such, more research is needed, especially on aspects of SIP that are largely absent from current assessments.

Middleton et al.'s (2020) study attempted to generate greater insight into EBP in Canada by having clinicians self-evaluate the extent to which they should engage in a practice and how often they perceived others to engage in those same practices. Similarly, to attempt less biased reporting of SIP, my study assessed the scientific competencies and knowledge of psychologists beyond mere self-report. Taking inspiration from Gaudiano et al., (2011a, 2011b, 2012), this survey assessed the degree to which clinicians think scientifically and are protected against pseudoscience in order to attest to *competencies*, not just reported allegiance. The hope was to provide generalizable information about practice across Canada, including scientific competency, and the factors that possibly divide more and less science-informed clinicians (such as type or extent of training).

Methods

Sampling

Inclusion and Exclusion Criteria. Due to both the overlapping nature and claims of uniqueness of professional counselling, clinical psychology, and counselling psychology, professionals from all three categories were recruited. Only Canadian clinicians were recruited, with an effort to recruit adequate numbers from across Canada, representing the possible variability between jurisdictions.

Therefore, anyone who was a licensed or registered professional counsellor or psychologist (or synonymous) in Canada was included. Counsellors and psychologists (including

provisionally registered psychologists) needed to hold active registration/licensure and were required to have seen clients for at least one year total (although not necessarily currently). Other specialized psychologists (e.g., sports psychologists, organizational psychologists) were excluded unless they indicated primary training in counselling, clinical psychology, or counselling psychology.

Sampling Frame. A full roster of psychologists and counsellors in Canada is not available. Some jurisdictional registers are publicly available, some with contact information and some without, and some Canada-wide population numbers are available.

At the last reporting, there were 5000 counsellors certified through the Canadian Counselling and Psychotherapy Association (CCPA; 2022). This is a rough guideline regarding the population of counsellors or equivalent since many other regulating and certifying bodies exist across Canada. In other words, there are more registered mental health professionals roughly equivalent to certified counsellors in qualification and practice area that are not accounted for by this number. As for psychologists, by the last Canadian Institute for Health Information (CIHI; 2022) report, there were 19,591 psychologists in Canada. The exact number of counselling psychologists and clinical psychologists within this sample is unknown. Furthermore, some number of psychologists in this group have specializations and training backgrounds in areas that may exclude them from my study (e.g., industrial/organization psychologists, neuropsychologists, school psychologists). Thus, it appears that the framing population is around 25,000 people, since some unknown number of psychologists in that group may not qualify and many more counsellors are not accounted for.

Recruitment. Participants were recruited using non-probability sampling with a combination of convenience, quota, and snowball sampling. Since a full roster of psychologists

and counsellors in Canada is not available, random sampling was not possible. Instead, using convenience sampling, I reached out to as many clinicians as possible across Canada through various avenues to recruit volunteer respondents. The main avenue of recruitment was through Facebook, where I posted a survey invitation (adapted from Appendix A) to approximately 59 cross-Canada and jurisdiction-specific groups or pages. I also used 18 mailouts and similar (e.g., direct emails, listserv messages, website posts, newsletters) through various associations and regulatory bodies. Finally, I emailed personal networks across the country and asked them to participate and to pass on the recruitment invitation.

A major consideration of this research design was recruiting in a somewhat disguised manner to attract the widest audience possible, thus increasing variability in the sample (and responses). If advertised as "about science," those interested in or already favoring science (or otherwise opinionated) would likely dominate the sample. Thus, I invited participants using a broader explanation, specifically asking them to weigh in on how biased clinical decision-making is in Canada (see Appendix A).

Participant Characteristics. The survey was meaningfully completed by 335 participants. Participant average age was 44.7 years, ranging from 25 to 74 (*SD* = 11.5). Average years of clinical practice was 10.5, ranging from 1 to 42 (*SD* = 9.0). Participants were predominantly female (81.3%), master's-level (58.9%), registered psychologists (56.2%), from Alberta (40%). Almost all were engaged in clinical treatment (94.9%), and large minorities were engaged in formal assessment and clinical supervision (36.6% and 35.7%, respectively). These and other demographic statistics are presented in Table 1.

Combining all types of psychologists and roughly equivalent (e.g., provisionally registered psychologists, psychological associates), and combining all counsellors, registered

Table 1

Demographic Statistics

Characteristics	*n* = 331	%
Gender		
Female	269	**81.3**
Male	55	**16.6**
Gender Diverse & Non-Binary	7	**2.1**
Degrees Attained/In Progress[a]		
M.Ed.	44	**13.3**
M.A.	129	**39.0**
M.Sc.	45	**13.6**
M.Ps.	5	**1.5**
M.C.	74	**22.4**
M.SW.	8	**2.4**
Ph.D.	100	**30.2**
Psy.D.	26	**7.9**
Ed.D.	2	**.6**
Highest Degree Attained/In Progress		
Master's	195	**58.9**
Doctorate	126	**38.1**
Other	10	**3.0**
Licensure Type		
Psychologist (Registered, Licensed, etc.)	186	**56.2**
Provisional Psychologist (Psychologist Candidate, etc.)	32	**9.7**
Psychological Associate	1	**.3**
Registered Psychotherapist	46	**13.9**
Canadian Certified Counsellor	16	**4.8**
Other Registered or Certified Counsellor (Pastoral, Clinical Counsellor, Counselling Therapist, etc.)	37	**11.2**

Social Worker	13	**3.9**
Work Types[a]		
Clinical/Counselling Treatment	314	**94.9**
Formal Assessment	121	**36.6**
University/College Instruction	39	**11.8**
Research	41	**12.4**
Managerial, Administration, or Clinical Director	26	**7.9**
Clinical Supervision	118	**35.7**
Academic Supervision	25	**7.6**
Public Education/Advocacy	21	**6.3**
Program Evaluation	22	**6.6**
Professional Consultation	96	**29.0**
Other	7	**2.1**

Note. Totals may not sum to 100% because of missing or additional data.

[a] Total for *n* will not equal 331 as participants could select any that applied.

psychotherapists and roughly equivalent (e.g., social workers, art therapists), resulted in 219 psychologists (66.2%) and 112 counsellors (33.8%). I further analyzed these numbers by jurisdiction and then compared them to proportions of each registrant type as reported by CIHI (2022) and CCPA (2022). Based on CIHI (2022) demographic information for psychologists across Canada, Canadian psychologists are roughly 74% female. The survey sample is slightly more dominated by females (at 81.3%), only in small part due to a slightly higher proportion of female counsellors than psychologists (82.9% versus 79.5%). Regarding jurisdictions, the survey sample roughly matches Canadian proportions other than for Alberta (21.1% in Canada versus 52.3% in the sample), Ontario (21.0% in Canada versus 9.6% in the sample), and Québec (40.3% in Canada versus 15.1% in the sample; Table 2). For counsellors, the survey sample approximates the Canadian proportions other than for Ontario (26.5% in Canada versus 44.1% in the sample), and for New Brunswick, Nova Scotia, and Newfoundland and Labrador, which were all underrepresented by approximately 5% of each respective Canadian proportion (Table 2).

Sample Size. Using G*Power 3.1.9.7 (Faul et al., 2007), a minimum sample size was computed for a multiple regression with six predictors with typical input parameters (i.e., medium effect size of .15; alpha of .05; power of .90; Czincz & Romano, 2013; Norcross & Lambert, 2011; Stewart & Chambless, 2007). The resultant minimum sample size was 123. Alternatively, using a typical sample size calculator, considering the population to be roughly 25,000, with a confidence level of 95% and 5% margin of error, the required sample size is 379. A sample of this size is historically difficult to reach in research of this kind (e.g., Pradhan & Bedi, 2019; von Ranson & Robinson, 2006). Although I aimed for it, my sample size did not quite reach 379. It is, however, well above the G*Power minimum sample size.

Table 2

Practice Location for Participants Compared to National Demographics (CCPA, 2022; CIHI, 2022)

	Psychologists				Counsellors			
	Survey Sample		CIHI in 2020		Survey Sample		CCPA in 2022	
Jurisdiction	*n* = 218	%	*n* = 19,591	%	*n* = 111	%	*n* = 5,000	%
Alberta	114	**52.3**	4,143	**21.1**	18	**16.2**	836[a]	**16.7**[b]
British Columbia	12	**5.5**	1,261	**6.4**	27	**24.3**	1233[a]	**24.7**
Manitoba	4	**1.8**	331	**1.7**	8	**7.2**	269[a]	**5.4**
New Brunswick	15	**6.9**	364	**1.9**	2	**1.8**	416	**8.3**
Newfoundland and Labrador	5	**2.3**	244	**1.2**	-	**-**	221	**4.4**
Northwest Territories	1	**.5**	63	**.32**[c]	1	**.9**	-[a]	**-**
Nova Scotia	5	**2.3**	650	**3.3**	2	**1.8**	379	**7.6**
Nunavut	-	**-**	30	**.15**	-	**-**	-[a]	**-**
Ontario	21	**9.6**	4,107	**21.0**	49	**44.1**	1326	**26.5**
Prince Edward Island	2	**.9**	55	**.28**	1	**.9**	36	**.7**
Québec	33	**15.1**	7,895	**40.3**	1	**.9**	152	**3.0**
Saskatchewan	6	**2.8**	511	**2.6**	2	**1.8**	132	**2.6**
Yukon	-	**-**	-	**-**	-		-[a]	**-**

Note. The CCPA certified counsellor demographics were used as a rough guideline since each jurisdiction may have its own regulatory body (or several), and most counsellors in the sample were not certified through CCPA. Totals may not sum to 100% due to rounding.

[a] CCPA (2022) combines Alberta and Northwest Territory numbers, British Columbia and Yukon numbers, and Manitoba and Nunavut numbers. [b] Northwest Territories counsellors were added to this proportion calculation as per [a]. [c] No statistics for psychologists were reported by the Northwest Territories in 2020, so 2019 numbers were used.

Survey

Overview. The survey was a national self-completion survey administered online, hosted by *SurveyMonkey*. It was cross-sectional, meaning data were collected only once from each respondent (Stoop & Harrison, 2012). Although not encouraged, technically enrollment was not controlled, and a respondent could elect to complete the survey more than once. It was largely a descriptive survey (Kelley et al., 2003), seeking to better understand the phenomenon of SIP and to describe associations between professional characteristics (e.g., training, licensure, years in practice), attitudes, and science-informed knowledge and skills. The survey was administered online to allow for better accessibility to clinicians across Canada, and to improve response rates and representativeness. Being a self-completed survey allowed respondents to answer questions with less pressure. This survey did not seek to measure change across time, or before and after training, so it only needed to be completed once to gauge a clinician's current professional background, attitudes, and science-informed knowledge and skills.

The survey covered various elements and components of SIP. The survey did not include extensive questions on elements of SIP that have already been reasonably and recently assessed in the Canadian context such as research literacy, progress monitoring (or robust feedback systems), and elements of self-reported SIP-endorsement. Rather the topics covered in this survey included:

1. Science-informed skills (e.g., critical thinking skills including logic and pseudoscience detection)
2. Science-informed knowledge (e.g., foundational knowledge, scientific practice knowledge)
3. Science-informed attitudes (e.g., growth orientation, SIP attitudes)

4. Demographics and training information (e.g., licensure, training type, education level, extent of relevant science-focused training)

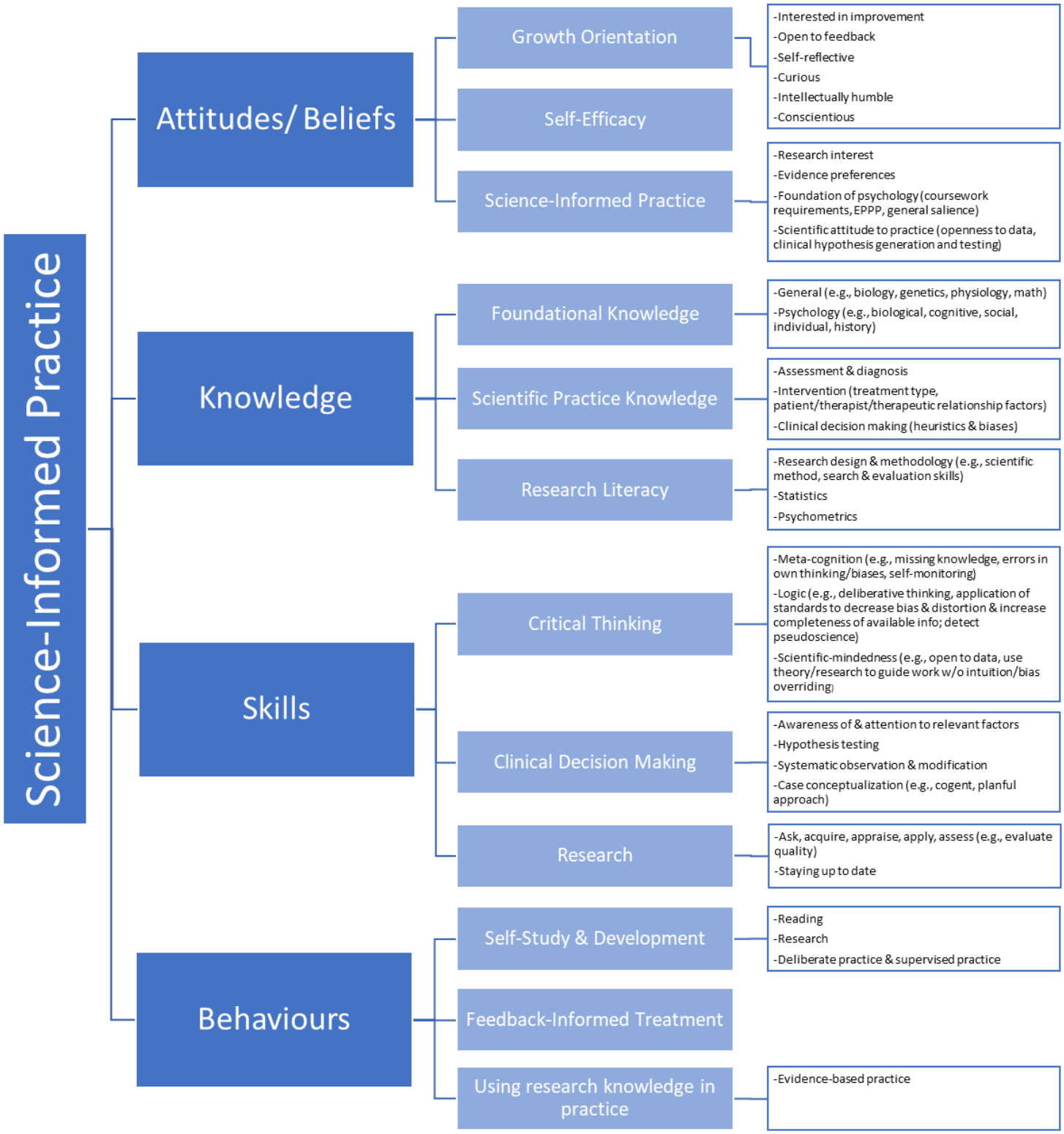
As per what has been least covered in the extant research and because of my own specific interests, the predominant focus of the survey was science-informed skills, particularly critical thinking skills. Knowledge constituted a smaller proportion of questions, and attitudes were an important correlate to cover. The predictors were otherwise predominantly contained in the demographics section.

Survey Development Process. The survey was designed as part of a graduate level course on survey design (January through April of 2021). Broadly, this process involved learning about the principles and processes of sound survey design and developing the survey, including workshopping the survey with classmates, pilot testing, expert review, and formal assessment by the course instructor. Details about some of these processes are included here.

Concept Map and Question Creation. After extensive review of the literature, I created a concept map to attempt to account for elements of the construct (SIP) I intended to measure (Figure 1). This concept map was not meant to be exhaustive but sought to cover the main components of SIP and to elucidate some subcomponents. The main components included Attitudes/Beliefs (e.g., growth-orientation, self-efficacy, SIP), Knowledge (e.g., foundational knowledge, scientific-practice knowledge, research literacy), Skills (e.g., critical thinking, clinical decision-making, research skills), and Behaviours (self-study and development, feedback-informed treatment, using research in practice). These follow the main framework of SIP as explored in the first chapter. To reiterate: these components and subcomponents are inextricable, meaning that there is overlap between elements of SIP where, for example, some attitudes would stem from specific knowledge, or where skills would be based on knowledge and

Figure 1

Science-Informed Practice Concept Map



coincide with certain behaviour, and so on.

Using the concept map, I identified subcomponents of most interest to me and in greatest need of exploration (constrained by practicality). I leaned heavily on the literature (e.g., Garb & Boyle, 2015; Lilienfeld et al., 2013; Meichenbaum & Lilienfeld, 2018; Novella et al., 2018) to further parse out components of pseudoscience, illogic, and bias (Appendix B) and attempted to map a question on to each. Using both the concept map and the components of pseudoscience, I designed questions applied to the professional psychology context. Ultimately, knowledge questions were more idiosyncratic than critical thinking ones in that they depended largely on popular misconceptions (to my mind) or areas of particular interest to me. Appendix C provides "meta-data" demonstrating the intentions of each question, including which subcomponents were meant to be covered and briefly how.

Pilot Study. To obtain feedback on my survey, between February and April of 2021 I solicited two peer-reviews, three think-aloud interviews, four expert reviews, and a pilot study with 40 participants. As a result, I made several dozen changes to the survey, from small to large.

"Think-alouds" are a type of cognitive interviewing where participants narrate their inner dialogue while answering survey questions (Campanelli, 2008). Participants were encouraged to share their thinking and rationales while answering questions, and were engaged in follow-up dialogue to further elucidate their survey decision-making after each question.

First, I had a think-aloud with a colleague of mine who is strongly informed by science. Together we reviewed all parts of the survey over several hours. After this review, I had a think-aloud with another colleague where we went through the first scenario on the survey and part of the second. In a third think-aloud, another colleague and I reviewed the second scenario and part of the first. After each think-aloud, I made multiple changes to the survey.

Simultaneously, I had three subject area experts review the survey, some in more detail than others. All experts have worked in the field of EBP or SIP for many years and are considered national leaders on the topic. I made major and minor changes to the survey as a result of all expert reviews.

Finally, I sent the survey out to my network for piloting, receiving 40 responses. However, four respondents did not advance beyond the inclusion questions, and two respondents quit the survey shortly after beginning. Thus, I had 34 complete responses. I also received brief feedback from a few of these respondents, some of which led to small changes to the survey. For further details of changes made because of pilot testing, see Appendix D.

After the survey content was finalized, I had the survey and related documents professionally translated into French by a native French speaker who is also a researcher in EBP and psychological science (see Appendix E and Appendix F for the English and French versions of the survey).

Survey Content and Procedure. The survey begins with an introduction, condensed consent information, links to the full information letter and consent form (see Appendix G for both English and French versions), and researcher contact information. Respondents were asked if they consented on this first page.

Consenting respondents then answered questions about the three inclusion criteria: (a) having completed graduate education in counselling, counselling psychology, clinical psychology, or a close equivalent; (b) being a psychologist, provisional psychologist, registered psychotherapist, certified counsellor, or similar; and (c) seeing clients for at least one year total as a registered, licensed, or certified professional.

Respondents who answered yes to all inclusion questions were then taken to the first

section of the survey. This section contained 13 SIP skill and knowledge questions, comprised of two sets of questions: the first followed a therapist (James) and his client (Jo) through various scenarios; the second followed a psychologist (Daniel) and his client (Alex) through various scenarios. Questions were presented after brief vignettes, describing some element of practice and/or clinical decision-making and often contained a matrix of sub-items to endorse or rate (meaning the 13 questions comprised several dozen individual "items"). Importantly, the survey was designed so that the respondent would assess the clinician's (James' or Daniel's) decision-making. This was meant to de-personalize their answers and thus access more honest judgments. It also made the questions more realistic in that they involved some "real world application" as opposed to being overly hypothetical or theoretical.

Broadly speaking, questions in this section assessed fallacious reasoning; pseudoscience detection; assessment and actuarial reasoning; knowledge about mechanisms of treatment, pathology, and change; knowledge about quality of evidence; and some foundational knowledge in cognitive and abnormal psychology. Questions in this section used various response types (e.g., single-answer multiple choice, multiple-answer multiple choice, and Likert scale questions).

Importantly, skills- and knowledge-based questions were designed to have answers that most conformed with SIP. For example, SIP responses included endorsing actuarial over intuitive/clinical decision-making, seeing pseudoscience in a claim of manifest destiny-type treatment; seeing illogic in arguments from antiquity; or seeing problematic basic science in a claim that high emotions while remembering make memories more reliable. In other words, there were more and less correct answers to each question and to be regarded as most science-informed meant answering the questions correctly or endorsing the most science-informed

position.

After the SIP knowledge/skills section, respondents used a Likert-scale to rate their agreement with 24 different attitude/belief items. These included items meant to assess humility, growth mindset, openness to data and learning, and beliefs about the place of science in practice.

The next section of the survey comprised demographics and training questions. These questions included age, gender, jurisdiction, professional regulatory title, preferred title, years in practice, work settings, work types, training level and degree type, training type, and, finally, course-based and self-study-based training in various SIP areas, both general and specific (e.g., research methodology, statistics, psychology, diagnosis, EBP, feedback-informed treatment).

Exit questions included asking respondents if they had looked up information during the survey, and their experience working in the areas that were largely assessed during the survey (e.g., depression, career counselling, trauma). Finally, respondents were given more information about the research intent to survey SIP and thus invited to have their data removed from the study (see more in Ethical Considerations, below). Respondents were also invited to participate in a follow-up interview on the survey topics (as the original research plan included a qualitative phase).

Survey data collection occurred between June 2021 and February 2023. Most responses were received during June 2021, with other significant participant responses occurring in October and November of 2021, and in April and July of 2022.

Ethical Considerations. All questions, excluding the consent and inclusion questions, were optional during the survey to allow respondents to skip any questions they were unwilling to answer. Survey data were collected and stored online through end-to-end encryption by *SurveyMonkey* until data collection was complete, at which time my account was deleted along

with the data. I downloaded and stored data containing contact information (collected for follow-up interviews) on a secure, encrypted, password-protected computer and within password-protected files. Only I had access to the raw data containing contact information. Back-up copies of the data are stored on an encrypted external hard drive in password-protected files in a locked safe.

By nature of labelling my survey as solely about clinical decision-making and bias, I withheld the specific purpose of the study until the end. This choice of partial disclosure was, of course, approved by the Research Ethics Board. At the end of the survey, participants were informed that the survey was specifically investigating science-informed clinical decision-making and were invited to have their data removed. Three respondents indicated that they wanted their data omitted and they were removed from analyses. My (and my academic supervisor's) contact information was included alongside this written "debrief," inviting inquiries or comments about the study. (I received one email from a participant who took philosophical issue with my study but did not express concern specifically about the partial disclosure. I responded to this email, acknowledging the participant's perspective.)

Psychometrics. I intended to use Item Response Theory (IRT; Embretson & Reise, 2000) to further analyze my survey items. Applying measurement theory, specifically IRT, is a way to strengthen the rationale that connects a psychological construct (e.g., SIP) with participant survey behaviour (Embretson & Reise, 2000). Compared to Classical Test Theory, IRT provides item-level information, can be more flexible, and probabilistically identifies the relationship between respondents' latent trait levels and individual item responses.

As such, the first step toward building a psychometrically sound instrument included literature and theory-based concept mapping to clarify the construct and its components,

followed by the pilot study steps. After the survey was modified and administered, I explored the assumptions of IRT. One assumption of IRT is unidimensionality. This assumption could be fulfilled if the SIP test *overall* demonstrated that it was measuring one major construct (or factor), ideally SIP. Or, since my survey intended to measure three major components of SIP (outside of demographics), I could treat the survey as having three subscales: (a) SIP skills; (b) SIP knowledge; and (c) SIP attitudes. In this case, to satisfy the unidimensionality assumption of IRT, these subscales would each represent one factor of the construct, ideally confirmed through confirmatory factor analysis to load significantly with correspondent items as expected. As such, a confirmatory factor analysis was undertaken. Prior to this, reliability analyses using Cronbach's alpha were conducted to determine internal consistency of each subscale. These calculations were completed using the statistical software, jamovi 2.3.24 (The jamovi project, 2022) because it is capable of handling analyses with a mix of dichotomous and polytomous items.

Scoring. Many skill- and knowledge-based questions were multiple-answer multiple choice meaning that one question stem would have, for example, six response options that could be selected if the respondent thought they applied. Respondents might select all, select *none of the above*, or select one to many options. Each of these response options was treated as one dichotomous item since endorsing the item was SIP-based or not, and thus scored as 0 or 1.

Almost all attitude questions were on a 4-point Likert-scale and were not rescored beyond reverse scoring necessary items. Three items on this scale were dichotomous and remained as such. For the remainder of the knowledge and skills questions, all questions were computed to be scored out of 1 to make their scoring parallel when adding the item scores together. In other words, initially dichotomous items were scored as 0 or 1 (wrong or right), while polytomous items were originally scored most wrong (0) to most right (3). Once it was apparent that the best

use of the scale was to add scores together, the polytomous items were rescored to be out of 1 so that a correct answer on a polytomous item was not weighted at three times the weight of a dichotomous item. For almost all polytomous items, this rescoring meant the scores were transformed from 0, 1, 2, 3 to 0, .25, .75, 1. Although many paths could have been taken in terms of rescoring, upon reviewing questions and response options, it was determined that the .25 and .75 scores were more accurate or true to SIP than equally distributing the scores (i.e., 0, .33, .66, 1) since .25 responses were closer to wrong and .75 responses were closer to right. One other polytomous item had three response options and was rescored from 0, 1, 2 to 0, .5, 1 since the middle response option was fairly neutral (not wrong, but not as right as the full-credit option).

Variables

To clarify subscales and proceed toward confirmatory factor analysis and psychometric analyses, I assessed the reliability of each subscale to ensure that items were working together as intended. For this, I clarified the subscales to which each item belonged. When developing the survey items, there was overlap between knowledge and skills that only became apparent through subsequent research stages. Ultimately, upon the foundation of the literature and my own understanding of the SIP construct, I decided which items *most* fit in each section: skills, knowledge, or attitudes (see Appendix H for a visual representation of subscales and overlap, and Appendix I for scale-specific items, scoring, and rationale). These subscale determinations established a critical thinking skills scale, a knowledge scale, and an attitude scale. In terms of robust variables that were included in the regressions, the critical thinking skills scale produced the variable SIP_CTS for this study, explored below. The attitude scale produced the variable SIP_ATT, also explored below.

Outcome Variable. I calculated critical thinking skills (SIP_CTS) scores for each

respondent by adding together select SIP survey item responses. SIP survey items were determined by reliability and validity analyses and a full accounting of this process, and these items, is available in Appendix J and Chapter 3. In brief, the SIP_CTS scale includes 32 items and the scale had a Cronbach's alpha of $\alpha = .84$. The SIP_CTS score most reflects critical thinking skills (with some knowledge "contamination"). Knowledge scores, as discussed later in this chapter (in the Discounted Variables section), are only presented descriptively, and thus were not part of the SIP_CTS scale scores.

Predictors. Predictors included the SIP Attitude scores (SIP_ATT), gender (q23_GEN), years in practice (q27_PRACYRS), professional title type (q25_TITLE), training level (q30_DOCMAS), and training type (q31_TRAINING, q31_COUNS, q31_CP). Each are explained in turn.

SIP_ATT. The SIP attitude score was a composite score computed by adding together responses to all SIP attitude items, except three (items 21.1, 21.2, and 21.3). These three items were removed because they were "missing" substantial data due to a *not applicable* response option; including them meant a serious reduction in sample size for the regression. Also of note, this scale contained five items that were amongst the 13 SIP knowledge- and skills-related questions, but were, from the beginning, labelled as attitudes-based questions (items 7.4, 7.5, 12.2, 12.3, 12.4). Each primary analysis with SIP_CTS as the outcome variable was analyzed again with SIP_ATT and SIP_CTS trading places (i.e., outcome or predictor variable). In the end, the SIP attitude score was comprised of 26 items and had a Cronbach's alpha of $\alpha = .80$.

q23_GEN. The gender variable was transformed to include only respondents identifying as male or female due to sample sizes in other non-binary categories being much too small (i.e., 0.02% of sample, where four participants selected *gender diverse*, three indicated *non-binary*,

and 2 preferred not to say). During analysis, this categorical variable contained two levels, male or female.

q27_PRACYRS. This variable represented each respondent's estimate of the number of years engaged in clinical/counselling practice as a registered professional. Because it was an open-ended response item, I ensured all data were whole numbers (rounding up from half years in a few cases).

q25_TITLE. This variable represented specific professional titles such as registered psychologist, certified counsellor, and so on. Because there was an *Other* option with a text box to elaborate, I recoded several of these responses into new stand-alone response options. This included creating a new Social Worker response option. I also recoded some respondents who indicated that they were psychologists *and* neuropsychologists, placing those in the psychologist category. I then recoded the variable into two categories: psychologists and counsellors (and other non-psychologists), meaning the first psychologist level of this dichotomous variable included psychologists, provisional psychologists (and similar), and psychological associates. The second counsellor level included registered psychotherapists, Canadian certified counsellors, counselling therapists, other registered or certified counsellors (e.g., pastoral, clinical counsellor, counselling therapist, career counsellor), and social workers. Nine social workers participated in the study, answering yes to all inclusion questions and thereby indicating that they had graduate degrees in counselling, counselling psychology, clinical psychology, or similar. From looking at the social workers' responses, about half of them indicated having a graduate degree in counselling or similar (often in addition to a graduate degree in social work), while about half indicated having only a graduate degree in social work. While it was my intention to screen these respondents out via the inclusion questions, I expect that they understood themselves to have a

counselling-equivalent master's degree and I accepted this interpretation.

q30_DOCMAS. I manually coded this variable from all responses given to question 30 (asking respondents to indicate all university programs they had completed). Because this item allowed respondents to select all that applied, respondents could indicate each master's and doctoral degree they had. If someone had a doctoral degree, they were assigned the doctoral level of this binary categorial variable. If they had a master's but no doctoral degree, they were assigned the master's level. Notably, if someone indicated that they were in the process of completing a doctoral degree, they were included in the doctoral degree level.

q31_TRAINING, q31_COUNS, and q31_CP. Question 31 asked respondents what their graduate program of study was called: counselling, counselling psychology, clinical psychology, school psychology, marriage and family therapy, and other (with a text box to elaborate). Based on the qualitative information given in the text box, I created a new social work response option and recategorized several respondents into already existing categories based on their responses to this question in conjunction with their responses to other questions (i.e., what type of graduate degrees they had). This categorical variable was then recoded to have three levels (q31_TRAINING): counselling, counselling psychology, and clinical psychology. I excluded the "other" degree types from analyses at this point because it was a heterogeneous group that I did not expect to garner meaningful results. There were some PhD level neuropsychologists in the "other" group, alongside diploma-holding counsellors. Nothing seemed to tie them together outside being *not* purely counselling, counselling psychology, or clinical psychology graduates, and therefore the "other" category was not useful in the analyses. Finally, the three-level training type variable was recoded into two dummy variables for later use in the regression analyses: q31_COUNS for those with a counselling degree and q31_CP for those with a counselling

psychology degree (compared against those with clinical psychology degrees).

Discounted Variables. Regarding the SIP knowledge scale, coefficient alpha for the items deemed more purely knowledge-related (i.e., without the interference of critical thinking) was very bad ($\alpha = .02$). This result was chiefly because of many items that were negatively correlated with the total scale, demonstrating errant performance. Because these items were not performing as intended, they were removed from the knowledge subscale and the internal reliability rose to .28, still poor. In essence, the knowledge scale did not appear robust or useful and was thus discounted from the inferential analyses. Most of these items, upon review, were understandably non-conforming to the way intended. Some of these items will be explored on a per-item, descriptive basis in the Results section.

As per Hypothesis 5, I had intended to compute variable(s) to represent participant reports of SIP training using data from questions 32, 33, and 34 (i.e., undergraduate, graduate, and informal training in specific course and subject areas). Upon review of the data gathered from these questions, creating aggregated or additive variables seemed both formidable and, in places, problematic. Upon experimenting with computing certain variables, the sample sizes in some groups were too small. Thus, these data were left out of the analysis and Hypothesis 5 was not investigated.

Statistical Analyses

Statistical analyses, outside reliability and confirmatory factor analysis as mentioned above, were completed using IBM SPSS Statistics Version 29 (IBM, 2022). Descriptive statistics were computed for all relevant variables (e.g., gender, age, jurisdiction, years in practice, training type, and licensure type). Descriptive statistics and correlation analyses were also computed for all relevant variables to confirm the performance of the questions/scores and to check necessary

assumptions prior to analyses.

To answer my first research question (*To what extent do clinicians endorse and embody a science-informed approach to practice?*), I used primarily descriptive statistics, including comparing standardized scores for SIP skills and SIP attitudes, and analyzing the distribution of scores (e.g., normality, skewness). Furthermore, results on certain items are shared descriptively as information about singular components of SIP.

To answer my second research question (*What are the relationships between clinician characteristics (e.g., demographics, training, licensure) and embodiment of science-informed practice?*), I used inferential statistics with data gathered from all three sections of the survey (i.e., skills, attitudes, and demographics). SIP critical thinking scores were analyzed as the outcome variable using predictors from other sections (e.g., SIP attitude, licensure, years in practice, training). Essentially, I tested if SIP critical thinking scores could be predicted using SIP attitude and relevant demographic factors. For interest, I also tested if SIP attitude scores were predicted based on SIP critical thinking and relevant demographic factors. These analyses were accomplished via analysis of variance (ANOVA) and multiple regression.

Chapter 3: Results

Data and Scale Preparation

Survey Attrition and Missing Data

I reviewed all 561 survey responses and removed cases where consent was not given (n = 2), inclusion questions were skipped (n = 20), inclusion questions were "violated" (i.e., answered *no*; n = 31), or no questions were completed after a respondent consented and qualified (n = 70). Furthermore, I removed the data from the three participants who asked to have their data removed (see Ethical Considerations in Chapter 2). This process left 438 respondents who completed some of the survey. Eleven participants then abandoned the survey after the first science-informed practice (SIP) question (question 5, technically), 21 participants after the second SIP question, 10 participants after the third SIP question, three participants after the fourth SIP question, 17 participants after the fifth SIP question, 23 participants after the sixth SIP question, and around two participants abandoned the survey per question after that up until the demographics section.

Three hundred thirty-two respondents provided complete or almost complete data. Most respondents answered all questions. However, because of the option to skip questions, some questions were not answered. No effort was made to replace missing data given that the number of missing data points was small. In calculating total SIP skills scores (SIP_CTS) and total SIP attitude scores (SIP_ATT), respondents who had skipped any relevant question were left out of the analysis, amounting to minor reductions in participant numbers. Respondents with total SIP scores but other missing predictor variable data were also left out of regression analyses. All relevant variables were checked for unusual responses, and none were found.

Confirmatory Factor Analysis

Based on the literature, I created three subscales to represent SIP skills, knowledge, and attitudes. I ran a confirmatory factor analysis (CFA) with those three factors including the items found to behave as intended as per the reliability analyses (explained in Appendix J).

Using jamovi 2.3.24 (The jamovi project, 2022), I ran a CFA with three factors corresponding to the assignment of the items. The chi-square test for model fit was statistically significant, $\chi 2\ (2207) = 4555$, $p < .001$. Statistical significance indicates poor model fit, but that outcome is not surprising given the large sample size. jamovi provides other measures of model fit: the Comparative Fit Index (CFI) is a measure of how well the data fits the hypothesized model, adjusted for sample size, and should ideally be greater than .90 (Navarro & Foxcroft, 2022). jamovi also provides the Root Mean Square Error of Approximation (RMSEA) which assesses model fit, adjusted for sample size, and should ideally be less than .08. For the SIP model, the CFI was .532 (poor fit) and the RMSEA was .049 (excellent fit). According to Kenny and McCoach (2003), it is possible for RMSEA to improve while CFI worsens, due to an increasing number of variables. Given these results, the three-factor model proposed for the SIP test I created was not supported. CFA factor loadings are presented in Appendix K.

To briefly explore what factor structure might be found in the SIP items, I performed an Exploratory Factor Analysis (minimum residuals extraction, oblimin rotation) which returned eight factors with an eigenvalue greater than one, together accounting for 29.6% of the shared variance. Most of the factors contained few items (between four and ten). The factor loadings matrix is presented in Appendix L. Two of these factors appeared to correspond to attitudes of slightly different types. Another factor included all items from a single question (question 5) concerning logical fallacies. Other factors had items with no easily discernible orientation and

were more difficult to interpret. Thus, no useful unidimensional subscale was discovered or confirmed. As a result, the fundamental assumption of Item Response Theory (i.e., unidimensionality) was violated, meaning further Item Response Theory-based analyses were not possible. Importantly, survey multidimensionality raises construct validity concerns which are examined more extensively in the Limitations section.

Variable Demographics

Considering I was interested in differences between groups, it is important to describe the clinicians in this study and their various characteristics. By my categorization of psychologists and counsellors (i.e., non-psychologists), there were 219 psychologists in the sample and 112 counsellors. There were 195 master's-level clinicians and 126 doctoral-level clinicians. In terms of training, 130 clinicians had been trained in counselling psychology programs, 94 in clinical psychology programs, 42 in counselling programs, and 64 in other kinds of programs or a combination of programs. Cross-tabulation of these variables is presented in Table 3. The counselling psychology-trained group had almost half "counsellors" and many more master's-level clinicians as compared to the clinical psychology-trained group that was entirely made up of psychologists and was predominantly doctoral-trained. The counselling-trained group was mostly comprised of counsellors, almost entirely at the master's level. A one-way ANOVA with a post-hoc Tukey test showed that the clinical psychology group (M = 12.0 years, SD = 9.7) had been in practice longer than the counselling psychology (M = 8.8 years, SD = 7.9) group (p = .02) and somewhat longer than the counselling (M = 8.4, SD = 7.7) group (p = .059), $F(2, 258)$ = 4.46, p = .012, η_p^2 = .03.

Table 3

Demographics by Training Type

Variable		Counselling Psychology (n = 130)		Clinical Psychology (n = 94)		Counselling (n = 42)		Other (n = 64)	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Years in Practice		8.8	7.9	12.0	9.6	8.4	7.8	13.3	10.0
		n	%	*n*	%[a]	*n*	%[a]	*n*	%
Title	Psychologist	75	57.7	94	100	14	33.3	34	53.1
	Counsellor	55	42.3	0	0	27	64.3	30	46.9
Training Level	Master's Degree	98	75.4	12	12.8	38	90.5	46	80.7
	Doctoral Degree	30	23.1	81	86.2	3	7.1	11	19.3

Note. Totals may not sum to 100% because of missing data.

Research Question 1

This study's first research question asked: *To what extent do clinicians endorse and embody a science-informed approach to practice*? Here, an endorsement of SIP is measured by the SIP attitude scale and embodiment is measured by the SIP critical thinking scale. I present basic characteristics of these measures before exploring the two related hypotheses.

Variable Characteristics

SIP_CTS. With 334 valid scores, the mean score on the critical thinking scale was 22.0 (*SD* = 4.7, *Mo* = 21.5). The maximum score possible was 32.0 (the *most* science-informed score achievable), and the highest score amongst participants was 31.75 while the lowest score was 7.75.

SIP_ATT. With 322 valid scores, the mean attitude score was 50.4 (*SD* = 7.2, *Mo* = 50). The maximum score possible was 72 (the *most* endorsing of SIP attitudes), and the highest score amongst participants was 72 while the lowest score was 31.

Hypothesis 1

I hypothesized that clinicians would have higher average scores for endorsing versus embodying SIP, or, in other words, that attitude scores would be higher than scores on SIP knowledge and critical thinking measures. This was not the case. Clinicians did not appear to endorse SIP more than they embodied it, which is to say that attitude scores (SIP_ATT) were not higher than were critical thinking scores (SIP_CTS).

Because scores on these two measures were on different scales, I standardized both scores. I then computed the difference between each participant's standardized attitude and critical thinking score. If Hypothesis 1 was correct, most people, on average, would have a positive "difference" score because the standardized attitude score would tend to be higher than

the standardized critical thinking score for each participant. However, the average difference score was only 0.02 and the median was -0.09, meaning more people had negative than positive difference scores (54.1% to be exact). Furthermore, the Shapiro-Wilk test of normality was *not* statistically significant, $W(318) = .99$, $p = .097$, meaning that the difference variable was normally distributed. Finally, skewness for the difference variable (both statistically and upon visual review) was positive, $Sk = .27$ ($SE = .14$), meaning more difference values fell in the negative range.

Hypothesis 2

Hypothesis 2 posited that clinicians would not, on average, score highly on the test of SIP. This was *not* found, however, in terms of skewness, meaning clinicians did not perform as poorly as expected by the metric offered.

There is no objective or established way to determine what an excellent, good, bad, or minimally acceptable SIP_CTS score is, as no standard exists. Thus, I determined that assessment of not having scored highly would be corroborated by a positively (or at least normally) skewed distribution of scores (i.e., that the mode > median > mean). Looking at descriptive statistics, the median was barely greater than the mean ($Mdn = 22.1$ compared to $M = 22.0$), and the mode was less than both ($Mo = 21.5$). Visual inspection showed a reasonably normal distribution, but the skewness was negative, $Sk = -.34$ ($SE = .13$). Although skew was different than normal, $z = 2.53$, $p < .001$, Field (2013) cautions against interpreting skewness scores on large samples and suggests instead relying on visual plots. At the very least, the distribution is *not* positively skewed, meaning that Hypothesis 2 should be rejected.

Research Question 2

This study's second research question asked: *What are the relationships between*

clinician characteristics (e.g., demographics, training, licensure) and embodiment of science-informed practice? This research question included four hypotheses, each focusing on SIP_CTS as the outcome variable. Thus, the primary evidence for or against each hypothesis results from analyses with the SIP_CTS outcome variable. However, because I also measured SIP attitude, I ran each analysis with SIP_ATT as an outcome variable as well. SIP attitude was not the primary variable of interest in this research, partly because attitude has been previously investigated in other research. Furthermore, it was more important to assess skills (versus endorsement) in the event that, as in other research, attitudes were less predictive of SIP or competence. For interest, however, and in case attitude was differentially predicted by various predictors, SIP attitude was used as an alternate outcome variable throughout the results related to the second research question. SIP_ATT-focused analyses are presented throughout this section, generally immediately after each SIP_CTS-focused analysis.

Hypothesis 3

I hypothesized that training type would predict outcomes on a SIP test such that clinicians trained in clinical psychology programs would outperform those trained in counselling psychology programs who would, in turn, outperform those trained in counselling programs. This hypothesis was partly confirmed: on average, clinical psychology graduates scored higher than counselling psychology graduates and counselling graduates. However, counselling psychology graduates did not score higher than counselling graduates.

A one-way ANOVA was used to test if training type was associated with meaningful differences in SIP_CTS scores. The ANOVA was statistically significant, $F(2, 259) = 20.27$, $p < .001$, $\eta_p^2 = .14$. Tukey post-hoc tests revealed ($p < .001$) that being trained in clinical psychology was associated with higher SIP_CTS scores ($M = 24.4$, $SD = 4.3$) compared both to counselling

psychology (M = 20.9, SD = 4.7) and counselling (M = 19.9, SD = 4.6). Differences between counselling psychology-trained and counselling-trained clinicians were not statistically significant (p = .441).

Another one-way ANOVA was run to see if differences between groups were also found for SIP_ATT. Again, the one-way ANOVA was statistically significant, $F(2, 254) = 15.04$, $p < .001$, $\eta_p^2 = .11$. Tukey post-hoc tests ($p < .001$) found that clinical psychology graduates (M = 53.5, SD = 7.3) scored higher than both counselling psychology graduates (M = 49.6, SD = 7.0) and counselling graduates (M = 46.9, SD = 6.5). Differences between counselling psychology and counselling graduates was again not statistically significant (p = .089).

Hypothesis 4

Hypothesis 4 presumed that training level would predict SIP scores such that clinicians with doctoral degrees would outperform clinicians with master's degrees. This hypothesis was confirmed. In other words, doctoral-level clinicians scored higher, on average, than did master's-level clinicians.

A one-way ANOVA found that on the SIP_CTS, doctoral-level clinicians (M = 24.1, SD = 4.3) scored higher than master's-level clinicians (M = 21.0, SD = 4.6), $F(1, 315) = 35.86$, $p < .001$, $\eta_p^2 = .10$. In the same vein, a one-way ANOVA found that on the SIP_ATT, doctoral-level clinicians (M = 53.2, SD = 7.4) scored higher than master's-level clinicians (M = 48.7, SD = 6.5), $F(1, 306) = 32.39$, $p < .001$, $\eta_p^2 = .10$.

Combining Hypotheses 3 and 4, a two-way ANOVA was used to explore main effects of training level and type and the interaction between training level and type on the SIP_CTS scores. Training type included three levels (counselling, counselling psychology, clinical psychology), and training level consisted of two levels (doctoral, master's). This analysis showed

a main effect for training type, $F(2, 252) = 3.75$, $p = .025$, $\eta_p^2 = .03$ and a main effect for training level, $F(1, 252) = 8.99$, $p = .003$, $\eta_p^2 = .03$. The interaction was not statistically significant, $F(2, 232) = 0.91$, $p = .403$, $\eta_p^2 = .01$. In other words, both training type and training level had independent effects on the critical thinking test score (see Figure 2). Doctoral-level clinicians ($M = 24.2$, $SD = 4.4$) scored higher than master's-level clinicians ($M = 20.5$, $SD = 4.6$); clinical psychology-trained clinicians ($M = 24.5$, $SD = 4.3$) scored higher than counselling psychology graduates ($M = 21.0$, $SD = 4.7$) and counselling graduates ($M = 20.2$, $SD = 4.4$). Note that the highest average scoring group (doctoral-level counselling graduates) was made up of only three participants. Also cautionary, the sample size for clinical psychology graduates at the master's level was only 12.

In parallel with the above results, the same factorial ANOVA was run with SIP_ATT. There was again a main effect for training level, $F(1, 247) = 7.17$, $p = .008$, $\eta_p^2 = .03$, but no effect for training type, $F(2, 247) = 1.41$, $p = .246$, $\eta_p^2 = .01$, or a training level by training type interaction, $F(2, 247) = 0.41$, $p = .667$, $\eta_p^2 = .003$. Again, doctoral-level clinicians ($M = 53.6$, $SD = 7.2$) scored higher than master's-level clinicians ($M = 48.3$, $SD = 6.6$) on SIP_ATT.

Hypothesis 5

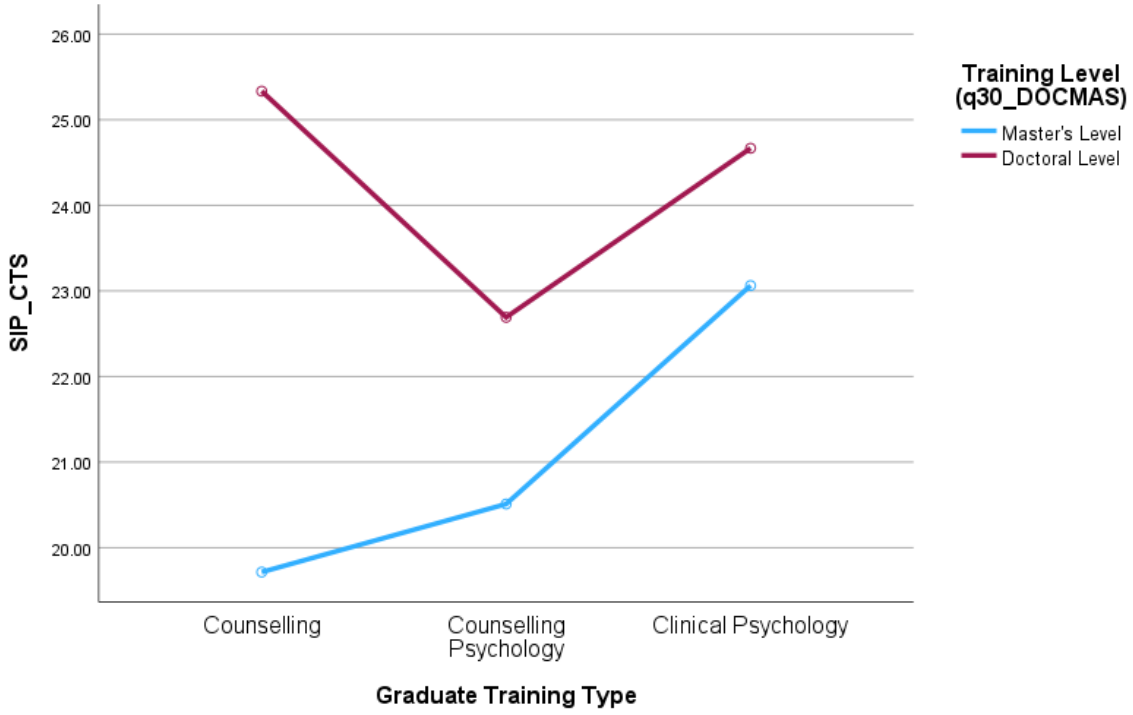
As discussed in Chapter 2 (Discounted Variables), after some exploration with data collected to assess training levels, no viable path was found. Thus, Hypothesis 5 was not testable due to inadequacy in the data collected regarding more specific formal and informal training.

Hypothesis 6

It was hypothesized that licensure type would predict SIP scores such that psychologists would outperform counsellors. This hypothesis was confirmed: psychologists had higher average critical thinking skills scores than did counsellors.

Figure 2

Training Type and Training Level on SIP_CTS (Critical Thinking Skills Score)



A one-way ANOVA found that psychologists (M = 23.3, SD = 4.4) scored higher than counsellors (M = 19.5, SD = 4.4) on SIP_CTS, $F(1, 325) = 54.18$, $p < .001$, $\eta_p^2 = .14$. Similarly, a one-way ANOVA found that psychologists (M = 51.7, SD = 7.1) scored higher than counsellors (M = 47.1, SD = 6.8) on SIP_ATT, $F(1, 315) = 24.04$, $p < .001$, $\eta_p^2 = .07$.

Test of the Model

After analyzing all hypotheses separately, a multiple linear regression was used to determine the overall model fit and to investigate how all relevant variables might differently predict total SIP scores when included in one model together. First, I checked if gender appeared to be a specific predictor of SIP_CTS score to determine its relevance in the model overall. Gender was not related to SIP_CTS, $F(1, 316) = 1.78$, $p = .183$, $\eta_p^2 = .01$. As an aside, gender was not related to SIP_ATT, $F(1, 306) = .52$, $p = .472$, $\eta_p^2 = .002$. Thus, gender was left out of the multiple regression analyses.

A hierarchical multiple regression was calculated to predict critical thinking skills scores (SIP_CTS) based on attitude scores (SIP_ATT), years in practice, title (psychologist or counsellor), training level (doctoral or master's), and training type (counselling, counselling psychology, or clinical psychology). Correlations between variables are presented in Table 4. The training type variable was added to the model as two dummy variables with counselling and counselling psychology compared to clinical psychology. Attitude score was added in a second step of the model. The first step with five predictors was statistically significant, $F(5, 237) = 13.22$, $p < .001$, $R^2 = .22$. Statistically significant predictors (see Table 5) were title ($\beta = -.21$, $p = .003$) and training level ($\beta = .19$, $p = .015$). A few predictors were substantially related to critical thinking scores (SIP_CTS) as seen in the zero-order correlations but were not statistically significant predictors in the model. The second step that added the attitude score (SIP_ATT) was

also statistically significant, $F(6, 236) = 31.73$, $p < .001$, $R^2 = .45$, as was the change from the first to the second step, $\Delta F(1, 236) = 97.44$, $p < .001$, $\Delta R^2 = .23$. Statistically significant predictors were title ($\beta = -.18$, $p = .003$), and attitude score ($\beta = .52$, $p < .001$). Again, a number of predictors were suppressed in the model. Assumptions of multiple regression, specifically normality, homoscedasticity, and linearity, were met according to the results from plots and partial plots of residuals. There was one standardized residual that exceeded the three standard deviation cut-off (Field, 2013).

A second hierarchical multiple regression was calculated to predict attitude scores (SIP_ATT) based on critical thinking (SIP_CTS), years in practice, title, training level, and training type. The first step with five predictors was statistically significant, $F(5, 237) = 8.79$, $p < .001$, $R^2 = .16$. The statistically significant predictor in this step (see Table 6) was training level ($\beta = .25$, $p = .002$). Again, a few predictors substantially related to SIP_ATT, as seen in the zero-order correlations, were not statistically significant predictors in the model. The second step that added critical thinking score (SIP_CTS) was also statistically significant, $F(6, 236) = 26.55$, $p < .001$, $R^2 = .40$, as was the change from the first to the second step, $\Delta F(1, 236) = 97.44$, $p < .001$, $\Delta R^2 = .25$. Statistically significant predictors were training level ($\beta = .14$, $p = .039$), and SIP_CTS ($\beta = .561$, $p < .001$). Again, a number of predictors were suppressed in the model. Assumptions of multiple regression, specifically normality, homoscedasticity, and linearity, were met according to the results from plots and partial plots of the residuals.

Table 4

Correlations among Predictor and Outcome Variables in Multiple Linear Regressions

Variables	1	2	3	4	5	6
1. SIP_CTS						
2. PRACYRS	.172**					
3. TITLE	-.379**	-.173**				
4. DOCMAS	.395**	.217**	-.480**			
5. COUNS	-.181**	-.117*	.338**	-.297**		
6. CP	-.233**	-.106*	.230**	-.413**	-.409**	
7. SIP_ATT	.616**	.145*	-.254**	.369**	-.195**	-.162**

Note. SIP_CTS = critical thinking skills test score; PRACYRS = years in practice; TITLE: psychologist or counsellor title; DOCMAS: doctoral- or master's-level training; COUNS = counselling graduate; CP = counselling psychology graduate; SIP_ATT = science-informed practice attitude score.

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

Table 5

Multiple Regression Results for SIP_CTS

Variable	*b*	*SE*	β	*r*
Step 1				
Constant	22.45	.87		
PRACYRS	.04	.03	.07	.17
TITLE	-2.21	.74	-.21**	-.38
DOCMAS	1.88	.77	.19*	.40
COUNS	-1.42	1.10	-.10	-.18
CP	-1.37	.80	-.14	-.23
Step 2				
Constant	5.39	1.88		
PRACYRS	.02	.03	.04	.17
TITLE	-1.89	.62	-.18**	-.38
DOCMAS	.60	.66	.06	.40
COUNS	-.47	.93	-.04	-.18
CP	-.89	.67	-.09	-.23
SIP_ATT	.34	.04	.52**	.62

Note. SIP_CTS = critical thinking skills test score; PRACYRS = years in practice; TITLE: psychologist or counsellor title; DOCMAS: doctoral- or master's-level training; COUNS = counselling graduate; CP = counselling psychology graduate; SIP_ATT = science-informed practice attitude score.

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

Table 6

Multiple Regression Results for SIP_ATT

Variable	*b*	*SE*	β	*r*
Step 1				
Intercept	49.98	1.38		
PRACYRS	.05	.05	.06	.15
TITLE	-.93	1.17	-.06	-.25
DOCMAS	3.76	1.22	.25**	.37
COUNS	-2.76	1.74	-.13	-.20
CP	-1.37	1.26	-.09	-.16
Step 2				
Intercept	30.77	2.27		
PRACYRS	.01	.04	.02	.15
TITLE	.96	1.00	.06	-.25
DOCMAS	2.15	1.04	.14*	.37
COUNS	-1.55	1.47	-.07	-.20
CP	-.20	1.07	-.01	-.16
SIP_CTS	.86	.09	.56**	.62

Note. SIP_CTS = critical thinking skills test score; PRACYRS = years in practice; TITLE: psychologist or counsellor title; DOCMAS: doctoral- or master's-level training; COUNS = counselling graduate; CP = counselling psychology graduate; SIP_ATT = science-informed practice attitude score.

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

Other Demographic Variables of Interest

Years in Practice

When independently investigating the relationship between years in practice and both outcome variables, a curvilinear relationship emerged between both pairs such that SIP critical thinking skills peaked at around 20 years of practice, $F(2, 319) = 9.90$, $p < .001$, $R^2 = .06$, and SIP attitude peaked at around 25 years of practice $F(2, 310) = 3.34$, $p = .037$, $R^2 = .02$. In essence, scores on both measures were lower at the beginning and end of one's career compared to the approximate middle of one's career.

Preferred Title

I asked participants for their official registered or certified title, their preferred title, and the type of training they received (counselling, counselling psychology, clinical psychology, etc.). There were two ways of assessing how participants trained in counselling psychology identified, or, in other words, what their preferred titles were. First, there were 130 participants who indicated receiving graduate training in counselling psychology. However, of the 130 having received this kind of training, only 75 were registered psychologists (or equivalent). For both groups (the group of 130 or the group of 75), the title *counselling psychologist* was preferred by a small minority. For example, of the 75 counselling psychology-trained psychologists, only 15 selected *counselling psychologist* as their preferred title (20%). The most preferred title was *psychologist* ($n = 36$; 48%). Seven participants selected *clinical psychologist*. Other title preference selections can be found in Table 7.

For the 130 counselling psychology-trained clinicians (including non-psychologists), the most selected title was still *psychologist* ($n = 36$) followed by *psychotherapist* ($n = 20$), *counselling psychologist* ($n = 17$), *counsellor* ($n = 16$), and *therapist* ($n = 11$). See Table 7 for

more title preferences amongst these participants. These data are confounded by non-psychologists having been trained in counselling psychology.

As a comparison, 94 participants indicated being clinical psychology graduates, and, of these, 50 selected *clinical psychologist* and 25 selected *psychologist* as their preferred titles (the remaining eight selected other psychologist titles; Table 7).

SIP Questions of Interest

Responses to Knowledge Items

The SIP portion of the survey contained some knowledge-based questions, most of which were left out of inferential analyses because they did not function well in a stand-alone scale. Some of these questions, when explored descriptively, present interesting information about participants. Other SIP questions that were included in the SIP_CTS score, and thus the inferential analyses, are also explored below. For a full account of item-level endorsement on all SIP_CTS items, see Table 8.

Memory. One question asked respondents how strongly they agreed with a therapist telling a client that "memories can be judged as more likely true if they evoke vivid emotions and strong physiological responses." Science-informed participants should strongly disagree with this statement, since emotional arousal is not a good measure of accurate remembering (Lynn et al., 2015).

A high majority of participants selected the science-informed *disagree* responses (34.9% strongly disagreed and 48.1% disagreed). Only 2.4% of participants strongly agreed with this notion of memory, and 14.6% agreed. When categorized by clinician type (psychologist or counsellor), 12.8% of psychologists agreed and 0.5% strongly agreed; 11.7% of counsellors agreed and 7.2% strongly agreed.

Table 7

Preferred Titles among Participants Trained in Counselling or Clinical Psychology

All Participants Trained in Counselling Psychology		
Preferred Title	*n* = 130	**%**
Psychologist	36	**27.7**
Psychotherapist	26	**20**
Counselling Psychologist	17	**13.1**
Counsellor	16	**12.3**
Therapist	11	**8.5**
Clinical Psychologist	8	**6.2**
Mental Health Therapist	8	**6.2**
Provisional Psychologist	5	**3.8**
Forensic Psychologist	1	**.8**
Counselling and Clinical Psychologist	1	**.8**
Art Therapist	1	**.8**
***Psychologists* Trained in Counselling Psychology**		
Preferred Title	*n* = 75	**%**
Psychologist	36	**48.0**
Counselling Psychologist	15	**20.0**
Clinical Psychologist	7	**9.3**
Provisional Psychologist	5	**6.7**
Therapist	4	**5.3**
Counsellor	3	**4.0**
Mental Health Therapist	2	**2.7**
Counselling and Clinical Psychologist	1	**1.3**
Forensic Psychologist	1	**1.3**
Art Therapist	1	**1.3**
All Participants Trained in Clinical Psychology		
Preferred Title	*n* = 94[a]	**%**
Clinical Psychologist	50	**53.2**
Psychologist	35	**37.2**

Neuropsychologist	5	**5.3**
Forensic Psychologist	1	**1.1**
Provisional Psychologist	1	**1.1**
Psychological Associate	1	**1.1**

Note. Totals may not sum to 100% because of missing data.

[a] One participant did not answer this question, so total valid $n = 93$.

Table 8

Psychologist and Counsellor SIP Critical Thinking Skills Response Frequencies

Item	Item Content	Least Science-Informed to Most Science-Informed →			
		Very justifiable	Moderately justifiable	Slightly justifiable	Not at all justifiable
5.1	As long as Jo and James have a good relationship, the treatment will probably work.	4.6%	24.2%	39.3%	32.0%
		16.1%	28.6%	30.4%	25.0%
5.2	The treatment is used by a majority of therapists.	10.0%	34.2%	38.8%	16.9%
		15.2%	41.1%	27.7%	16.1%
5.3	The course James took provided multiple true case studies of clients improving after receiving the treatment.	7.3%	31.5%	34.2%	26.9%
		14.3%	48.2%	30.4%	7.1%
5.4	The treatment has been around for many decades.	6.8%	29.7%	38.8%	24.7%
		16.2%	34.2%	30.6%	18.9%
5.5	The treatment is endorsed by a major professional psychology association.	26.5%	41.1%	23.3%	9.1%
		27.7%	42.0%	21.4%	8.9%
5.6	The developer of the treatment is a well-known name in the field.	6.8%	21.9%	41.6%	29.7%
		16.1%	35.7%	29.5%	18.8%
5.7	Since Jo likes the sound of the treatment and consents, he can go ahead with it.	10.0%	26.5%	37.0%	26.5%
		25.9%	35.7%	19.6%	18.8%
		Very true/ legitimate	Somewhat true/ legitimate	Somewhat false/ illegitimate	Very false/ illegitimate
7.1	He is more interested in paying attention to signs that the treatment is working with Jo, rather than seeking out evidence against it.	4.6%	29.7%	32.9%	32.9%
		7.1%	42.0%	33.0%	17.9%
7.2	He has seen Jo improving, and that is sufficient evidence.	3.7%	33.8%	42.5%	20.1%
		7.1%	56.3%	24.1%	12.5%
7.3	General research sources won't help him understand if the treatment works for his specific client.	1.4%	24.2%	36.1%	38.4%
		7.1%	33.9%	41.1%	17.9%
7.6	He has seen no proof that the treatment is ineffective, so he will carry on.	2.3 %	20.5%	31.5%	45.7%
		7.1%	25.9%	34.8%	32.1%
		Endorsed	Did Not Endorse		
8.1	Most clients can tell if therapy is helping them, so he can ask Jo.	34.2%	65.8%		
		40.2%	59.8%		
8.2	If Jo is improving while in therapy, it is likely because of the therapy.	7.3%	92.7%		
		5.4%	94.6%		

8.3	Multiple case studies show that this is an effective treatment, so objective progress monitoring isn't really necessary.	1.8%	98.2%
		1.8%	98.2%
8.4	James can holistically understand Jo's progress, so he doesn't need progress monitoring scales.	10.5%	89.5%
		13.4%	86.6%
8.5	Most therapists are good at telling if their clients are improving.	10.5%	89.5%
		10.7%	89.3%

		More confident	No effect	Less confident
9	How should this information change James' confidence in the treatment? [The treatment was claimed to help a *long* list of presenting concerns. See question vignette in Appendix E for full information.]	15.1%	58.4%	26.5%
		26.8%	59.8%	13.4%

		Very reasonable or unbiased	Somewhat reasonable or unbiased	Somewhat problematic or biased	Very problematic or biased
10.3	James finds an article explaining that the treatment works partly by retraining the body and mind to work at an ideal energetic frequency since trauma can throw off our internal balance and weaken the immune system.	0.5%	10.6%	36.2%	52.8%
		0.9%	28.2%	47.3%	23.6%
10.5	James finds an article explaining that this therapy works in part by concentrating one's thoughts on affirmations and visualizations to cause changes in the physical world.	0.9%	17.8%	33.8%	47.5%
		0.9%	31.5%	41.4%	26.1%
10.6	James' colleague tells him about several memorable clients who were helped a lot by this treatment.	0.5 %	22.4%	49.3%	27.9%
		0.9%	31.5%	47.7%	19.8%

		Endorsed	Did Not Endorse
11.1	Clinical intuition should be prioritized over questionnaire results.	6.8%	93.2%
		15.2%	84.8%
11.3	Clinicians should focus on their holistic understanding of clients, not on questionnaire results.	20.1%	79.9%
		35.7%	64.3%
11.4	Daniel has quite a bit of experience with depression and can trust his judgments.	24.2%	75.8%
		33.0%	67.0%
11.5	Daniel's clinical judgments can be strengthened further with the use of multiple robust questionnaires.[a]	89.5%	10.5%
		68.8%	31.3%

13.4	Daniel should affirm the client's perspective about what works for him, supporting Alex's use of acupuncture.	48.4%	51.6%
		83.0%	17.0%
13.5	If Alex has found acupuncture helpful, then this is a treatment that Daniel can support.	32.9%	67.1%
		58.0%	42.0%
14.1	There is good evidence that most adult children of depressed parents show insecure attachment.	11.0%	89.0%
		24.1%	75.9%
14.2	Depression is often a result of trauma.	10.5%	89.5%
		17.9%	82.1%
14.4	Most psychological problems have something to do with childhood events.	14.6%	85.4%
		28.6%	71.4%
14.5	Most children of parents with depression also have depression.	7.8%	92.2%
		10.7%	89.3%
15.4	Even if they are less reliable, assessment tools can be useful as long as there is context to interpret results holistically.	27.4%	72.6%
		48.2%	51.8%

		Therapist judgment	Client progress report	Client symptom report	Outcome measures
17	Which of the following should most convince Daniel that Alex has indeed improved significantly?	5.0%	22.8%	22.4%	49.8%
		5.4%	27.0%	27.9%	39.6%

Note. Psychologist values are highlighted. Totals may not sum to 100% because of rounding.

[a] Item 11.5 was reverse coded. Endorse was the correct answer.

Pseudoscience. One question explored how "biased ways of thinking can get in the way of clinical work," asking participants to rate various statements as more or less biased or problematic (from *very problematic or biased* to *very reasonable or unbiased*). Two of these statements directly corresponded to common pseudoscientific ideas about healing or treatment. One statement (item 10.3) explained that "[The therapist] finds an article explaining that the treatment works partly by retraining the body and mind to work at an ideal energetic frequency since trauma can throw off our internal balance and weaken the immune system." This statement not only contains a common pseudoscientific characteristic of obscurantist language, it is reminiscent of energy healing (demonstrating absence of connectivity to basic science, another marker of pseudoscience). Science-informed participants should label this statement as *very problematic or biased*. Among psychologists in the sample, 52.9% indicated that this statement was *very problematic or biased*, 36.2% chose *somewhat problematic or biased*, 10.6% said it was *somewhat reasonable or unbiased*, and 0.5% selected *very reasonable or biased*. Among counsellors, 23.6% indicated that the statement was *very problematic or biased*, 47.3% chose *somewhat problematic or biased*, 28.2% said it was *somewhat reasonable or unbiased*, and 0.9% selected *very reasonable or biased*.

The next statement included in this question (item 10.5) explained that "[The therapist] finds an article explaining that this therapy works in part by concentrating one's thoughts on affirmations and visualizations to cause changes in the physical world." This statement is reminiscent of manifestation or The Law of Attraction and demonstrates an absence of connectivity from basic science (a marker of pseudoscience). Science-informed participants should label this statement as *very problematic or biased*. Among psychologists, 47.5% indicated that this statement was *very problematic or biased*, 33.8% chose *somewhat problematic or*

biased, 17.8% said it was *somewhat reasonable or unbiased*, and 0.9% selected *very reasonable or biased*. Among counsellors, 26.1% indicated that the statement was *very problematic or biased*, 41.4% chose *somewhat problematic or biased*, 31.5% said it was *somewhat reasonable or unbiased*, and 0.9% selected *very reasonable or biased*.

Another question (13) on the first SIP section of the survey was based on a scenario in which a client indicates having found acupuncture helpful for coping with depressive symptoms. The client asks his therapist what he thinks about using acupuncture alongside psychotherapy and the survey participant is asked to select any of the options that would qualify as *justifiable responses* to the client. Science-informed participants were expected to endorse only two statements: (item 13.2) *Acupuncture may help because of "placebo" or more general therapeutic effects, so [the therapist] could provide some psychoeducation about this*; and (item 13.3) *Acupuncture is not a science-based approach and [the therapist] should not endorse it*. Three scientifically unjustifiable options were offered as well: (item 13.1) *There is not enough evidence to say if acupuncture does or does not help with depression, so [the therapist] should refrain from judgment*; (item 13.4) *[The therapist] should affirm the client's perspective about what works for him, supporting Alex's use of acupuncture*; and (item 13.5) *If [the client] has found acupuncture helpful, then this is a treatment that [the therapist] can support*.

Beginning with the science-informed responses, 21.9% of psychologists endorsed that teaching the client about placebo effects was a justifiable response, while 9.8% of counsellors endorsed the same. For the response option indicating that acupuncture is not science-based and should not be endorsed, 5% and 2.7% of psychologists and counsellors agreed, respectively.

For the statements deemed not to be science-informed, 39.7% of psychologists agreed that there is not enough evidence to say if acupuncture does or does not help; 48.4% agreed that

the therapist should affirm the client's perspective and support the use of acupuncture; and 32.9% agreed that if the client has found acupuncture helpful, it can be supported by the therapist. For counsellors, these endorsements were 28.6%, 83.0%, and 58.0%, respectively.

Client Affirming. Much like items 13.4 and 13.5 that essentially prioritize client affirmation over basic science, question 5.7 had participants rate how justifiable it is to go ahead with a treatment because a client likes the sound of it. On this item, 10.0% of psychologists thought this was *very justifiable*, with 26.5% and 37.0% thinking it *moderately* or *slightly justifiable*, respectively. More than half the counsellors indicated that client interest was sufficient rationale for treatment, either *moderately* or *very* justifiably (35.7% and 25.9%, respectively).

Assessment. One question (15) asked about career and personality assessment tools, including the Myers-Briggs Type Indicator (MBTI) which is known to have questionable reliability and validity (Pittenger, 2005). The scenario in this question indicated that the therapist has had the client complete the MBTI and asks the participant to endorse any response options that can justify the therapist's approach. One response option (item 15.1) offered that "*The MBTI has good reliability and validity*." The science-informed response to this option would be to *not* endorse it. For psychologists, 84.9% did not endorse this false statement, meaning 15.1% of psychologists endorsed the MBTI as reliable and valid. For counsellors, 81.3% did not endorse the statement as justified, meaning 18.8% agreed that the MBTI is reliable and valid.

Question 17 asked participants to indicate which evidence should most convince the therapist in the scenario that the client had improved significantly. Three options were distractors (i.e., *less*/*least* science-informed): (a) the client reporting reduced symptoms and greater career direction; (b) the therapist noticing the client to be happier, less guarded, and more aware of

problematic coping styles; and (c) the client reflecting positively and clearly regarding gains in knowledge and skills. The correct answer was the response option indicating that outcome measurements showed reduced distress levels and improved functioning.

Psychologists chose the science-informed outcome measurement answer 49.8% of the time, with client self-report regarding symptoms chosen by 22.4% of psychologists, and client reflections on gains chosen by 22.8% of psychologists. Five percent (5%) chose therapist observation as the most convincing of significant improvement. Counsellors had similar selection rates, with 39.6% choosing outcome measures, 27.9% choosing client self-report of symptom reduction, and 27.0% choosing client progress reflections. Only 6 counsellors (5.4%) chose the therapist observation option.

Explanatory Factors. One question (16) asked about mechanisms of change in therapy, where the participant was asked to select the best or most likely explanation for the client's progress. Four response options highlighted different mechanisms: therapeutic alliance, treatment type, client factors, or therapeutic factors. Another option allowed the participant to indicate that they were unfamiliar with process/outcome research, and the final option indicated methodological issues with process/outcome research and thus no fair answer to the question. The two most science-based answers were the client factors mechanism (Tasca et al., 2018) and the methodological limitations of the process/outcome literature (Cuijpers et al., 2019).

Psychologists predominantly chose the therapeutic alliance option (66.5%), followed by treatment type (11.0%). Twenty psychologists said they were unfamiliar with process/outcome research (9.2%) and 4.1% indicated that therapist factors were the most likely explanation for the client's progress. The correct options of client factors and methodological limitations were chosen by 6.0% and 3.2% of psychologists, respectively. In other words, 9.2% were more

science-informed regarding mechanisms of change in therapy.

For counsellors, 72.3% chose the therapeutic alliance as the best explanation for client change. Ten counsellors (8.9%) said they were unfamiliar with the process/outcome research, and 4.5% each chose treatment type and therapist factors. The correct client factors option was chosen by 6.3% of counsellors, and the correct methodological limitations option was chosen by 3.6% of counsellors. Said another way, 9.9% of counsellors demonstrated science-informed knowledge about mechanisms of change.

A similar item (5.1) asked about therapeutic alliance, claiming that if there is a good therapeutic relationship, a treatment will probably work. Almost half of the counsellors indicated this to be moderately or very justifiable (28.6% and 16.1%, respectively), with 30.4% labelling it as slightly justifiable. For psychologists, few indicated this to be very justifiable (4.6%), but 24.2% labelled it as moderately justifiable, and 39.3% as slightly justifiable. These responses attest to the perceived importance (or even centrality) of the therapeutic alliance.

Responses to Attitude Questions

Science Bias and Postmodern Endorsement. A handful of items assessed what might be termed postmodern attitudes to science and the "medical model" (i.e., as biased or problematic). Science was asked about directly in one case (item 7.5; "*Science is biased and too easily dismisses what isn't part of the dominant paradigm*"). In the other items, diagnosis was indicated as unhelpful (item 12.2), stigmatizing (item 12.3), or part of the medical model and thus deserving de-emphasis (item 12.4).

For item 7.5, only 1.4% of psychologists thought it was *very true/legitimate* that science is biased and dismissive of ideas outside the dominant paradigm. Forty-three psychologists (19.8%) thought this statement was *somewhat true*/*legitimate*. However, 35.9% and 42.9%

thought it was *somewhat false*/*illegitimate* or *very false*/*illegitimate*, respectively. For counsellors, 5.4% thought it was *very true*/*legitimate* that science is biased and dismissive of non-dominant paradigms. Opinions were split equally between the three remaining options with 31.3% each thinking this statement was either *somewhat true*/*legitimate* or *somewhat false*/*illegitimate*, and 32.1% endorsing the sentiment as *very false*/*illegitimate*.

For the diagnosis-related items (12.3, 12.4, 12.5), small minorities of psychologists agreed that diagnoses were unhelpful (8.7%), stigmatizing and thus worth avoiding (6.4%), or part of the medical model and deserving of de-emphasis (16.4%). For counsellors, proportions were somewhat higher: 21.4% agreed that diagnoses were unhelpful, 15.2% that they were stigmatizing and better avoided, and 25.9% that diagnosis is part of the medical model and worth de-emphasizing. These and other aggregated attitude responses are presented in Table 9.

Other Attitudes. Other notable points of interest among the Attitude responses include sentiments toward science and research in practice. There was almost complete agreement that it is necessary to understand basic psychological principles to be good at one's job (item 20.5). No psychologist strongly disagreed and only 0.5% disagreed. These proportions were essentially matched by counsellors in the sample. Similarly, almost no participants disagreed with valuing research or science (items 20.1 and 20.2) and a large majority indicated research to have practical use (item 7.4). Both psychologists and counsellors almost entirely agreed that they *should* use counselling/clinical research to inform their work (item 20.3), and more than half of respondents disagreed or strongly disagreed that it is difficult for professional psychology/counselling to be scientific (75.8% of psychologists and 65.2% of counsellors; item 19.6). In some contrast, over 50% of counsellors disagreed or strongly disagreed that their clients would be better off if they were scientist-practitioners, whereas only 23.3% of psychologists

Table 9

Psychologist and Counsellor SIP Attitude Response Frequencies

Item	Item Content	Endorsed		Did Not Endorse	
12.2	Even if Alex meets the criteria for Major Depressive Disorder, diagnoses are often unhelpful.	8.7%		91.3%	
		21.4%		78.6%	
12.3	Diagnoses can be stigmatizing, so it is better to avoid the label.	6.4%		93.6%	
		15.2%		84.8%	
12.4	Diagnosis is part of the medical model and should be de-emphasized.	16.4%		83.6%	
		25.9%		74.1%	
		Very true / legitimate	Somewhat true / legitimate	Somewhat false / illegitimate	Very false / illegitimate
7.4	Research provides little practical use.	0.9%	3.2%	20.1%	75.8%
		1.8%	5.4%	25.0%	67.9%
7.5	Science is biased and too easily dismisses what isn't part of the dominant paradigm.	1.4%	19.6%	35.6%	42.5%
		5.4%	31.3%	31.3%	32.1%
		Strongly Disagree	Disagree	Agree	Strongly Agree
18.1	To improve, it is necessary that I question my actions and decisions.	0.5%	0.9%	45.2%	53.4%
		1.8%	3.6%	50.0%	44.6%
18.2	I remain skeptical of my clinical decision-making.	5.5%	47.0%	39.7%	7.8%
		14.3%	49.1%	33.9%	2.7%
18.3	I am regularly wrong about things, even when I feel like I'm right.	11.4%	58.9%	27.9%	1.4%
		14.3%	58.9%	24.1%	2.7%
18.4	If I work with a client for long enough, I will develop a nearly complete understanding of them.[a]	16.0%	66.7%	16.0%	0.5%
		23.2%	58.0%	17.0%	1.8%
18.5	It is necessary to make concrete plans in order to improve in my clinical work.	1.8%	17.4%	62.1%	18.7%
		2.7%	28.6%	56.3%	12.5%
18.6	I am very concerned about the impacts of cognitive biases (or irrational ways of thinking) on my clinical judgments.	2.7%	34.7%	49.8%	12.8%
		8.0%	35.7%	42.9%	13.4%
19.1	As long as I continue seeing more clients, I will naturally improve over time.[a]	15.1%	63.9%	19.2%	1.8%
		8.0%	48.2%	38.4%	5.4%
19.2	I probably think I am more effective than I really am.	2.7%	49.8%	44.7%	2.7%
		7.1%	50.9%	39.3%	2.7%
19.3	I really like reading about new research findings in several fields outside psychology and counselling.	4.1%	30.1%	56.2%	9.6%
		3.6%	22.3%	50.0%	24.1%

19.4	I really like reading about new research in counselling/clinical psychology.	1.8%	11.0%	59.4%	27.4%
		1.8%	10.7%	47.3%	40.2%
19.5	When I hear about new research contradicting my clinical practices, I force myself to look into it.	0.5%	6.4%	67.1%	26.0%
		0.9%	6.3%	62.5%	30.4%
19.6	It is difficult for professional psychology/counselling to be scientific.[a]	21.9%	53.9%	21.9%	1.4%
		10.7%	54.5%	26.8%	7.1%
19.7	I regularly consult primary research sources to answer my questions about practice.	0.9%	27.9%	53.0%	18.3%
		3.6%	24.1%	20.9%	20.5%
20.1	I value research.	0.5%	2.7%	42.0%	54.8%
		0.0%	1.8%	50.9%	46.4%
20.2	I value science.	0.0%	2.3%	41.1%	56.6%
		0.9%	2.7%	56.3%	39.3%
20.3	I should use counselling/clinical research to inform my work.	0.0%	1.8%	51.6%	46.1%
		0.0%	2.7%	59.8%	37.5%
20.4	I approach my clinical work like a scientist by gathering data, and generating and testing hypotheses.	1.8%	23.7%	55.3%	19.2%
		2.7%	41.1%	45.5%	10.7%
20.5	It is necessary to understand basic psychological principles in order to be good at my job.	0.0%	0.5%	41.6%	57.5%
		0.0%	1.8%	42.9%	55.4%
20.6	Psychotherapy is more art than science.[a]	4.6%	54.3%	33.8%	7.3%
		2.7%	39.3%	42.9%	15.2%
20.7	The more I know about psychological science, the better I am at my job.	0.5%	13.2%	50.7%	35.6%
		0.9%	17.9%	59.8%	21.4%
20.8	My clients are better off if I am a scientist-practitioner.	1.8%	21.5%	47.0%	29.7%
		7.1%	50.0%	32.1%	10.7%

Note. Psychologist values are highlighted. Totals may not sum to 100% because of missing data.

[a] Items were reverse coded (18.4, 19.1, 19.6, 20.6).

disagreed or strongly disagreed (item 20.8). Finally, 41.1% of psychologists and 58.1% of counsellors agreed or strongly agreed that psychotherapy is more art than science.

In terms of over-estimation of one's abilities, the majority of respondents disagreed that they are "regularly wrong about things, even when [they] feel like [they're] right" (item 18.3) and about half disagreed that they probably think they are more effective than they really are (item 19.2). As an adjacent characteristic, most clinicians did *not* endorse a statement indicative of naive realism: most clinicians disagreed that if they work with a client for long enough, they will develop a nearly complete understanding of them (item 18.4). In a test of the experience fallacy, a large majority of psychologists also disagreed that they would naturally improve as long as they continue seeing clients (only 19.2% agreed; 1.8% strongly agreed; item 19.1). Counsellors were surer of such natural improvements, with 38.4% and 5.4% agreeing or strongly agreeing, respectively.

Finally, although clinicians resoundingly agreed that to improve they need to question their actions and decisions (item 18.1), more disagreed than agreed that they are skeptical of their clinical decision-making (item 18.2) and only about half agreed that they were concerned about the impacts of cognitive biases on their clinical judgments (item 18.6).

Chapter 4: Discussion

Science is claimed to be foundational to professional psychology (e.g., Beatch et al., 2009; Vespia & Sauer, 2006). Science can enhance practice and outcomes (e.g., Hartman et al., 2016; Lilienfeld & Basterfield, 2020) and science-informed practice (SIP) is arguably an ethical imperative (Blease et al., 2016; CPA, 2017). However, little is known about the extent to which Canadian psychologists (or counsellors) are informed by science (Fitzpatrick et al., 2015), and rhetoric may not match action or implementation (Drapeau & Hunsley, 2014).

This research investigated the degree to which psychologists and counsellors in Canada endorse and embody a scientific approach to practice. Regarding *endorsement*, scientific attitude was assessed; regarding *embodiment*, critical thinking skills were assessed. This research also sought to understand relationships between SIP and clinician demographics. Demographics assessed included licensure type, years in practice, training type, and training level.

Regarding attitudes, clinicians appeared to generally endorse a SIP attitude. In other words, Canadian clinicians generally appeared to feel positively toward science and SIP. Regarding critical thinking, clinicians embodied SIP on 68.8% of items (i.e., scoring an average of 22 out of 32 on the critical thinking items). Clinicians answered correctly on many critical thinking items, although they failed to answer correctly on some items.

Regarding relationships between demographics and science-informed attitude and critical thinking, training level (doctoral vs. masters), training type (clinical vs. counselling psychology or counselling), and licensure type (psychologist vs. counsellor) all predicted performance on science-informed attitude items and critical thinking items. Training appears to matter to science-informed attitude and critical thinking skills, with more graduate training in general, and clinical psychology graduate training in particular, being associated with more science-positive and

science-informed clinicians. Along these same lines, psychologists were more science-positive and science-informed than counsellors. Yet even more so than training level, training type, and licensure type, it was a SIP attitude that was the strongest predictor of science-informed critical thinking skills.

This research study approached assessment of science-informed critical thinking using a novel measure. While some previous studies have assessed clinicians regarding SIP in Canada (e.g., Ionita & Fitzpatrick, 2014; Middleton et al., 2020), this research is sparse, usually narrowly focused, and often limited to mere self-report. It may be easy for clinicians to *endorse* certain practice approaches or to report that they even *engage* in those approaches; however, a direct test of competence removes the fallibility of self-report, producing a truer understanding of proficiency and of the general state of professional psychology practice.

How Do Canadian Clinicians Feel About Science and Research?

Clinicians generally agreed with various principles of SIP believing that science makes them better at their jobs, that research and science are valuable, and that research has practical use and ought to inform their practice. These sentiments coincided with more clinicians disagreeing that clients are better off with therapists who are scientist-practitioners. Moreover, about half of clinicians considered psychotherapy to be more art than science. Discrepancies in how clinicians view the science-practice relationship have been seen in past studies. For example, clinicians in Middleton et al.'s (2020) study reported endorsing process-outcome research, intervention studies, and randomized controlled trials as more important to practice than basic psychological science. Although some part of this sentiment seems entirely reasonable (such as intervention studies presumably demonstrating more *obvious* value to treatment practice), the relative devaluing of basic psychological science suggests nuance in the kinds of

science that psychologists believe to be most fundamental to good practice.

Nonetheless, from a perspective of championing SIP, we can take comfort from the positive attitudes espoused by participants. Most clinicians respected and valued science for its role in practice. Perhaps the notion of psychotherapy as more art than science reflects how SIP is expressed. It may be easier to express value in science and the centrality of psychological principles to practice than it is to endorse the scientist-practitioner model with its complex history and multiple interpretations. It is also possible that some statements are endorsed because of their highly recycled nature. In other words, clinicians may hear statements that become familiar and thus canonized: *Psychotherapy is more art than science*; *You have to meet the client where they're at*; *Diagnoses are part of the medical model*. Such familiarity may breed passive acceptance and easy propagation.

The most disconcerting attitude finding was the lack of expressed concern about bias. Nearly half of respondents disagreed that they were very concerned about the impacts of cognitive biases on their clinical judgments. However, it is likely that agreement with this item would increase if the wording was softened (being *concerned* instead of *very concerned*). Still, clinicians demonstrated troubling rates of over-confidence, with more than half disagreeing that they are regularly wrong about things even when they feel they are right and disagreeing that they remain skeptical of their own clinical decision-making. While these items are not perfect correlates for humility or scientific thinking, these items should garner greater agreement considering the fallibility of human judgment and the core of critical inquiry (i.e., doubt). In concert with Walfish et al.'s (2012) findings that people in general overestimate the accuracy of their observations and judgments, perhaps these rates of overconfidence among clinicians are unsurprising.

I would contend that despite the lamentations of postmodern rhetoric (Ghaemi, 2010; Lilienfeld, 2010), a minority of clinicians in this sample, especially psychologists, endorsed postmodern attitudes (e.g., science as biased, diagnoses as stigmatizing). However, a larger minority did agree that diagnosis is part of the medical model and thus should be de-emphasized, a common postmodern idea. Overall, postmodern-type attitudes were more highly endorsed by counsellors than by psychologists, an important difference to note in terms of the professions (or professionals) that might contribute more to the erosion or devaluing of science (or at least certain aspects of SIP).

In summary, science-positive attitudes were endorsed among participants, suggesting that the scientist-practitioner gap is perhaps less about anti-science sentiments and more about other possible influences such as insufficient opportunity, training, or regulation regarding scientific practice. On the other hand, there are somewhat troubling areas of science-hesitation and skepticism about the degree to which our profession can be scientific. Moreover, clinicians may be over-confident and under-concerned about their own biases (see Lilienfeld et al., 2013).

Do Canadian Clinicians Practice What They Preach?

This research sought to investigate the possibility that clinicians might endorse a SIP attitude while demonstrating lesser science-informed critical thinking. Comparing standardized attitude and critical thinking scores did not garner this result. In other words, clinicians did not endorse a scientific attitude more than they embodied scientific competence. This failure was unexpected given previous findings of clinicians espousing positive beliefs in science while (seemingly unknowingly) reporting or endorsing non-scientific practices (Gaudiano et al., 2012; Luebbe et al., 2017). On the other hand, some Canadian results have shown equivalence between clinician self-reports of endorsement (i.e., attitude) and embodiment (i.e., engagement in science-

based practice *acts*; Middleton et al., 2020).

Are Canadian Clinicians Informed by Science?

Clinicians did not perform as poorly as expected on the test of science-informed critical thinking and critical thinking scores were not skewed positively. These results represent important departures from this study's hypotheses, indicating that clinicians in Canada are more science-informed than was expected. In other words, although I expected clinicians to perform relatively poorly on the test of critical thinking, in fact, critical thinking scores were reasonably good by some interpretations. As a limitation, proper assessment of the extent of science-informed critical thinking requires a benchmark or criterion of some kind to determine who falls in the acceptable (or not) range. No such standard exists.

Although crude, descriptive statistics do lend some insights. The average score on the critical thinking test was 22 out of 32 or 68.8% correct science-informed answers. Moreover, two-thirds of participants scored between one standard deviation below and above the average, scoring between 17.3 and 26.8 or 54.1% and 83.4%. Perhaps this can be considered a good result and generally good performance. Yet perhaps this average would be disconcerting to lay people or clinicians who might interpret this performance as signalling that many clinicians are falling in pseudoscientific and illogical traps.

Another way of looking at scores on the critical thinking questions is the average percentage of psychologists selecting the *most* science-informed answer; that would be 57.2% of psychologists. Thus, about half of psychologists (and even more counsellors) did not select the best answer on the critical thinking items. For some items, more than 95% of respondents selected the best answer; for some items, fewer than 10% did. Again, the standing of 57.2% best-answer-selections across all items, just like the standing of an average test score of 68.8%, is

debatable. It is reasonably clear, at least, that most clinicians endorsed unscientific answers at some point during the test, but that on average clinicians endorsed science-informed answers.

It seems that clinicians, especially psychologists, are reasonably informed by science in various knowledge and critical thinking domains such as memory, logical fallacies, actuarial versus clinical decision-making propensities, and pseudoscience detection. A strong possibility with assessing the state of clinical practice, especially anecdotally to this point, is that the loudest voices are not always the most representative. It seems likely that in this realm the voices often heard (or noticed) are those loudly protesting science or practicing in problematic violation of it, whereas the quieter and perhaps more common perspective is that of reasonable SIP. Overall, based on survey results across many questions, we can take some comfort in the percentage of clinicians endorsing science-informed answers.

Beyond the averages, a more fruitful approach may be to examine specific critical thinking items or sets of items to assess performance. For example, the test contained multiple items assessing basic logic (e.g., asking how justifiable various problematic or illogical arguments were, such as arguments from authority, anecdote, or antiquity). On one set of these logic-based items (items 5.2 to 5.7), psychologists endorsed logical fallacies as moderately or very justifiable an average of 43.2% of the time (58.1% for counsellors). On a set of questions assessing clinician endorsement of naïve realism (items 7.2, 8.1, 8.5, and 11.4), an average of 26.6% of psychologists justified naïve realism (36.8% of counsellors did the same). On an item about confirmation bias (item 7.1), 34.3% endorsed an example of confirmation bias as legitimate (49.1% for counsellors). On items assessing non-actuarial "holistic" thinking (items 8.4, 11.3, 15.4), an average of 19.3% of psychologists endorsed unscientific answers (32.4% for counsellors). Perhaps most glaringly, regarding mechanisms of change in therapy (item 16), few

psychologists (9.2%; 9.9% for counsellors) were aware of the science on the matter. Namely, participants believed the therapeutic alliance to be the more important factor for therapeutic outcomes over client factors such as client readiness, pretreatment functioning, or support systems (see Tasca et al., 2018). The other best answer for this item was to acknowledge the methodological limitations of the process/outcome literature, along the lines of the in-depth review by Cuijpers et al. (2019).

Overall, many clinicians were science-informed in their answers to specific questions. However, we might still be troubled by the proportion of clinicians making errors on items testing their reasoning and scientific knowledge. These errors may be disconcerting if we believe in the scientific prowess of clinicians, the scientific identity of the profession, and the value of training programs, *even if* a majority of clinicians were more reasonably scientific. In other words, perhaps the majority is still too low, or specific errors too concerning. One consideration is the rippling effect of even a small minority of less scientific clinicians. For example, clinicians frequently prefer non-empirical sources of influence that may lead to a variety of non-empirical beliefs or approaches to clinical decision-making (Middleton et al., 2020), and any number of clinicians espousing non-scientific beliefs can influence other clinicians in turn, especially through supervision and collegial relationships.

Which Clinician Characteristics Predict Science-Informed Practice Skills and Attitudes?

This research investigated differences in performance on the critical thinking skills items between counsellors and psychologists, doctoral-trained and master's-trained clinicians, and training types (i.e., clinical psychology, counselling psychology, and counselling). Clinical psychology graduates scored higher on the critical thinking items than counselling psychology or counselling graduates. Counselling psychology graduates and counselling graduates did not

differ. Thus, being trained in a clinical psychology program is associated with stronger critical thinking (i.e., less often falling prey to statements of illogic, pseudoscience, or incorrect practice knowledge).

We might not be surprised that clinical psychology programs train their students to think more like scientists. Clinical psychology students complete research projects (i.e., a thesis or dissertation) whereas counselling psychology and counselling programs may be course-based and/or not require original research. Completing research projects may impact research and scientific literacy, although one study found that at the undergraduate level they did not (Balloo et al., 2016). Otherwise, I am aware of only one loosely relevant finding by Sharp et al. (2008) that speaks to this question of training differences, where scientist-practitioner program graduates displayed stronger critical thinking skills than graduates from programs not ascribing to the scientist-practitioner model.

Another explanation for the relationship between training type and critical thinking skills may be who chooses clinical psychology programs in the first place (Balloo et al., 2016; Gelso et al., 2013). In other words, an individual's natural inclinations toward rationality or scientific endeavours may lead them to select clinical psychology programs. Once accepted into those programs, success in that environment (e.g., obtaining scholarships or research assistantships) may further their inclination toward SIP.

The lack of difference between counselling psychology and counselling graduates in terms of critical thinking skills and science-informed attitude is surprising. Although a null finding, perhaps the overlap between training programs and licensure for counselling psychology and counselling explains the failure to find differences between these groups. A substantial proportion of counselling psychology-trained graduates were *not* psychologists by registration

status, demonstrating professional overlap between counselling psychology and counselling (see Haverkamp et al., 2011; Pradhan & Bedi, 2019). Perhaps students with shared characteristics attend counselling psychology and counselling programs. Or perhaps counselling psychology and counselling programs are not as different as some might claim (e.g., Beatch et al., 2009; Sinacore, 2015).

As an adjunct, clinical psychology graduates held the most positive SIP attitudes compared to counselling psychology and counselling graduates (who were indecipherable from one another). In concert, Stewart, Chambless, and Baron (2012) found that graduate training with a research focus was associated with more favorable attitudes toward empirically supported treatments. Here, the same explanations can be advanced for attitude as for critical thinking. Clinical programs may inculcate more positive regard for science, thereby enhancing a SIP attitude. Alternatively (or concurrently), students who already have a positive attitude toward science may be more likely to choose a clinical psychology program.

Regarding training level, doctoral-level clinicians outperformed master's-level clinicians on the critical thinking skills items. Scientific attitude was also more positive among doctoral-level clinicians compared to master's-level clinicians. We might speculate that doctoral training has an impact on critical thinking skills and attitudes. When considering what is different between doctoral-level and master's-level clinicians, we might fairly assume that there is more research interest or value in the former over the latter (see Green et al., 2018; Luebbe et al., 2017; Stewart, Chambless, & Baron, 2012). Doctoral- and master's-level graduates might also differ in terms of disposition (Gelso et al., 2013), with that disposition lending more to scientific approaches for doctoral-level students over master's-level students. On the other hand, it is possible that doctoral training does enhance scientific competence and attitude through learning

and exposure to research and science, alongside exposure to colleagues, professors, and supervisors who possess positive regard for science and astute scientific skills.

Previous research has found doctoral-level clinicians to be stronger critical thinkers (Gaudiano et al., 2012) and more oriented to EBP (Parrish & Rubin, 2012) than master's-level clinicians. In their longitudinal research study, Hill et al. (2015) found that doctoral training created positive change in some areas (e.g., therapeutic alliance, skills, conceptualization) but not in others (e.g., session quality, client symptom reduction). In Canada, Ionita and Fitzpatrick (2014) found that doctoral-level psychologists were more likely to engage in the science-based practice of progress monitoring.

There was no interaction between training level and training type in this study's results. In other words, having a doctorate did not explain higher critical thinking scores among clinical psychology graduates as compared to other graduates. In terms of attitude, again no interaction between training type and training level was found. These independent effects suggest that more positive SIP attitudes and scientific literacy may be a result of training type (and not just level), and/or that, once again, the traits and abilities of students who choose or are admitted to different programs may be the reason for differing competence and attitude levels.

Finally, licensure type was associated with critical thinking skills and SIP attitudes. Specifically, psychologists had more positive attitudes and higher critical thinking scores than counsellors. This finding supports claims that psychologists and counsellors differ in their views and practice of science (Beatch et al., 2009). Similarly, Legault and Laurence (2007) found that psychologists and social workers differed in their beliefs and expertise related to the science of memory, with psychologists performing better than social workers.

The strongest predictor of critical thinking skills was science-informed attitude. Tasca et

al. (2014) similarly found that attitudes were the largest contributor to research intentions. The attitude variable supressed the influence of other demographic variables except for title. The prevailing strength of title as a predictor suggests that regardless of attitude, psychologists are more likely to have stronger critical thinking skills than counsellors.

Professional Identity

A central aspect of this research concerns the professional identity of Canadian psychologists and counsellors in general, and counselling psychologists in particular. Counselling psychology has been alleged to be scientifically founded and oriented (e.g., Beatch et al., 2009). Despite attempts to measure this professional identity in Canada (e.g., Bedi et al., 2016; Hiebert & Uhlemann, 1993), no reliable accounting of its scientific foundation and orientation exists.

Professional identity is a curious thing, particularly when thought of as a uniting identity among a group of professionals, and in contrast to thinking of it in terms of ontogeny or individual development. If a group of professionals hold it in common, how does it arise? Presumably, individuals are inculcated into a profession as part of their scholastic training and supervised apprenticeship. There is an osmotic element to professional identity and a formal indoctrination component. Because of its seemingly diffuse or intangible nature, professional identity seems akin to professional culture. And culture is complex and individually experienced.

The CPA's (2009) definition of *counselling psychology* provides a list of shared values. These values include being strengths-focused, client-centred, holistic in conceptualization and assessment, systems-focused, and socioculturally sensitive. In this CPA definition, mention is made of a *mutually informative* relationship between research and practice, highlighting EBP and psychological principles as foundational. These values capture the essence of counselling

psychology's alleged professional identity and culture.

This study adds to counselling psychology's identity. First, the most preferred title among counselling psychologists is simply *psychologist*. This identity contrasts with clinical psychologists who prefer identifying themselves specifically as clinical psychologists. It may be due to counselling psychology's minority (or even "inferior") status, as compared to clinical psychology, that clinicians are not eager to be identified as such. If there is a hierarchy, perhaps counselling psychologists *level up* by considering themselves as psychologists. It is also possible that the sense of identity as a counselling psychologist lacks strength, clarity, or inculcation, leading many psychologists trained in counselling psychology to reject that nomenclature. If professional identity comes from training, this part of training is not working.

Psychotherapy was popularly endorsed as an art over a science. That rhetoric might be interrogated further for its source and catalysts. Is this view of psychotherapy acquired during graduate school? Shared between colleagues? Transmitted via the wider culture? All the above? How does this view propagate in each of those spaces, and how might we examine the deeper meaning, consequences, and possible remedies? Lilienfeld et al. (2013) explored resistance to EBP, from naïve realism to popular myths to EBP misconceptions. Lilienfeld et al. indicated that such resistance was understandable considering its entrenched origins "which are often left unaddressed in graduate training" (p. 895). Without investigating and remediating these deep-rooted biases and misconceptions, SIP is simply less likely.

At the very least, the attitude or rhetoric that sees professional psychology as struggling to be scientific likely indicates reduced efforts toward research endeavours. If psychotherapy is deemed unmeasurable or unknowable or even mystical, why even try to measure it? Although there is no imperative that *every* human be a scientist, to relinquish the quest toward better

understanding (as epitomized by science) has consequences. Where a client or average citizen surely has every prerogative to choose the unexamined path, a psychologist or any person claiming expertise or taking on a role of great responsibility (helping, healing, etc.) has, then, responsibility for the consequences of choosing an unexamined path. Progress certainly will not be made if the quest to understand is deemed impossible, or perhaps even just too difficult. No reasonable person would hand over the responsibility of any human endeavour in need of greater understanding to an individual who thinks such understanding is not possible.

The other important message regarding the hard-to-be-scientific argument is that if a clinician is not practicing from a foundation of science and indeed thinks being scientific is too difficult or even wrong, transparency in practice, in professional identity, and in regulation should be emphasized. Such clinicians should ensure that their clients understand that approach, alongside its potential risks and benefits. This transparency is a part of truly informed consent (Blease et al., 2016). More generally, highly publicized statements of professional identity ought to be amended: *We are scientific in the following ways, but otherwise think it is too difficult. Here is what we do instead…*

Another point of interest in the survey results is the client-affirming or client-centred trend. Regardless of professional identity, this affirming culture among psychologists and counsellors is alive and well. Relatedly, favoring "holistic" assessment as per the CPA (2009) definition of counselling psychology was also present among respondents, more so for counselling- and counselling psychology-trained clinicians. Highlighted in the results especially concerning the questions about acupuncture, there were relatively high rates of endorsing client-affirming options even when these options ran counter to science. Although it is possible that clinicians simply did not know about the ineffectiveness of acupuncture for treating depression,

many still endorsed items about affirming client choices (as opposed to simply endorsing the item about refraining from judgment). This finding highlights a trend among clinicians to pledge allegiance to client-centred professional psychology.

It is possible that the client-centred doctrine has the power to trump scientific imperatives (or truths). If a client thinks that Reiki, astrology, or crystal therapy is an effective treatment for, or approach to, a mental health concern, and *even if* a clinician knew that such an approach was pseudoscience, the client-centred clinician might still be inclined to, at minimum, make no comment and, at maximum, encourage the client. If it is true that the professional identity of being client-centred trumps the professional identity of being scientifically sound, then why and how might this be, and what might be the implications?

First, there might be a battle between identities or cultures, and we might have some evidence that the client-centred is winning out over the scientifically sound. In my experience, psychologists, as least the counselling ones and especially at the master's level, are trained in part to not give advice or pass judgment and to sit in a place of neutrality (except, perhaps, when it comes to social justice or advocacy issues). In some sense, this neutrality is a virtue among counsellors and counselling psychologists. Despite the nuance wherein a person arguably can be humble, can refrain from telling a client what to do, and can *still* offer a clinical opinion (or advice), the rhetoric can sound more black and white in its suggestions of abstinence. For example, a clinician ought not to judge, intervene, or steer because, as some will advance, the client is the expert (at least about themselves).

Much of this rhetoric is complex because it uses vague language interpretable in a multitude of ways. To illustrate, the idea of client-as-expert can seem patently false if it means the death of any expertise in the clinician (and then, of course, we could spend much time

exploring which realms of expertise the clinician does or does not possess, such as listening expertise but not the expertise to judge or intervene). If we abandon the death of expertise, we might shift to the notion that clients are experts on *themselves* (retaining the clinician as expert-of-[whatever]). In terms of self-report, this notion cannot be true with what we know about the human fallibility of self-judgment or judgment itself (to say nothing of the CBT approach of challenging false beliefs and distorted thoughts). If we do not mean client-as-expert in terms of self-report, then perhaps we mean that the client is self-determining, free, or autonomous? Such moral rights as these are highly regarded and prioritized in the CPA (2017) ethical code, just as autonomy has been highly regarded by moral philosophy for centuries and is foundational to classic liberalism (Christman, 2020).

If what we mean is self-determination and freedom, then perhaps we could say that clinicians ought to positively influence their clients through competent interventions, but not unduly *coerce* them. This notion makes space for being client-centred (i.e., respecting autonomy) while *also* being science-informed. To illustrate, a clinician can refrain from violating a client's freedom and self-determination to engage in pseudoscientific treatments while informing them of the scientific evidence. Balancing respect for autonomy with scientific interventions in this manner presents just one of many important competencies required of psychologists (and one, arguably, requiring a scientific mindset). Of course, some reticence to encourage clinical opinions of this sort may be justified if clinicians cannot be trusted to produce reliable science-based information (or if science is not even trusted in the first place).

I belabor this point for several reasons. First, language matters and where rhetoric is vague (but powerfully moralizing), we lose clinicians to a culture that is sometimes mindlessly unscientific. To be scientific is to be clear in what we say and what we mean. Second, there are

tensions between various cultures and identities in professional psychology, and these tensions may be working against a robust scientific foundation and a clear professional identity. Third, there is complexity to clinical practice and expertise (and, in turn, SIP and professional identity concerns), particularly where it concerns the capacity to trust clinicians as *science-informed experts*.

Indeed, the issue of who can be trusted to produce a reliable science-based opinion begs the question of professional differences. If a counsellor is trained in counselling skills but not in psychology or science, then perhaps this clinician is relegated to clinical work that never reaches beyond listening and emotional support (although we may interrogate what these efforts mean operationally). In other words, the science is absent and so the clinician must remain neutral in some sense (if that is even truly possible), because to do otherwise would be the equivalent of an untrained neighbour dispensing medical advice. If a psychologist has not been trained in science or is not scientifically literate (by some reliable measure), then perhaps it follows that this clinician should not be permitted to be directive or to guide the client beyond supportive listening.

To carry on this point, we expect our physicians to be more than neutral. Patients are not experts on treatment; rather, they go to their doctors seeking medical advice (balanced in almost all cases by informed consent, and thus self-determination). What then separates a physician from a psychologist? Both engage in extensive schooling and apprenticeship, take licensing exams, meet entry-to-practice requirements, and follow professional codes and standards. Are the life and death (or day-to-day) health matters of medicine less contentious or sensitive than the matters of psychological treatment?

Perhaps yes, but this lesser contentiousness or sensitivity is debatable and context

dependent. Is psychology less trusted than medicine (yes, it seems so) and ought it be? It seems reasonable to concede that psychological counselling deals in large part with values and personal non-empirical truths. This concession puts professional psychology on different ground than medicine (say, for example, regarding diabetes or cancer treatments that are generally (but not always) less value-laden (i.e., to live or die)). However, in many realms psychological science can enhance practice and lives without wading into the territory of moral truths or meaning-of-life-type matters. Thus, for those cases in which psychological science could inform treatment, akin to how medical science informs treatment, what is the essential difference between psychologists and physicians?

To start, our training is decades behind the standardization efforts of medicine (Baker et al., 2008). To back up, our first gatekeeping measure (the admissions process) is both mired by uncertainty as to what exactly we are looking for in viable candidates and avoidant of more robust means of making such determinations (e.g., Gower & Harris, 2020; McCaughan & Hill, 2015). To continue, the professional landscape is more diffuse (and thus unclear) with adjacent and overlapping professions, such as mental health counselling and clinical social work. To focus on the heart of the matter, we are not even sure that psychologists are science-informed and, what is worse, we have little reason to believe they are, given the extant research and the state of training and regulation. The present study found important differences between clinicians with more or less scientific literacy, and overall mixed findings in terms of the true extent of SIP among Canadian psychologists. We can fairly say that SIP among psychologists appears better than among counsellors, but we cannot say if the absolute levels of SIP are sufficient in themselves. However, in general, clinicians performed in a decently science-informed manner by this study's measures, and they outperformed expectations. In this sense, there is some promise

about our scientific abilities. On the other hand, performance worsened where questions of a client-affirming nature arose, and by some measures the minority falling prey to pseudoscience or logical fallacies can be viewed as understandably concerning.

Thus, we may still ask, if counselling psychologists in particular, or psychologists in general, are in a position to be trusted with clinical decision-making of a more intervening or directive nature considering their limited scientific knowledge. If counselling psychology-trained clinicians cannot be distinguished from counselling-trained counsellors, then the answer might be a tentative no. If only slightly more than half of psychologists select the science-informed option over pseudoscientific or less scientific options, we might concur with Baker et al. (2008) that trust in clinical psychology is ill-placed.

However, the profession is not at the beginning of its journey toward being scientific, and unequivocal distrust is ill-advised. Some clinicians are more scientific than others (as clearly demonstrated by this study's results). Further, more research into clinicians' scientific orientation is needed. This research study showed some strong scientific abilities and positive attitudes. Perhaps what is clear is that the state of science in the profession could be improved. Our admissions processes could be more robust, our training and supervision could be more standardized and science-based, and our regulations (including our ethics codes) could be more science-informed. Although it seems unreasonable to expect a profession as young as professional psychology to be *strongly* grounded in science, the imperative to improve is certain.

In terms of identity claims, if counselling psychology or any other professional psychology asserts a scientific foundation, there should be good evidence for it. Along the same lines, one aspect of the rhetoric that psychologists likely hear concerns efforts to obtain increased government funding and thus access to treatment by way of advancing psychology's *unique*

value (e.g., Psychologists' Association of Alberta, 2023). There are good arguments for less privatization of mental healthcare and thus increased access to treatment (e.g., Mental Health Commission of Canada, 2017; Vasiliadis et al., 2017). However, the idea of psychology's unique value rests upon it (a) having such a thing, and (b) proving it to others. The proving it notion is succinctly argued by Castelnuovo et al. (2016) who strongly encourage the use of outcome monitoring and other standardized measures to demonstrate efficacy and cost-effectiveness (among other things) in addition to the use of "research-supported psychological treatments" (p. 2).

The other notion of psychology actually *having* unique value is where professional training, regulation, and the overarching concept of identity come in. Being a scientist is not a faith-based enterprise or an assume-it-to-be so process whereby a person enters an idiosyncratic program, engages in (possibly largely unstandardized) supervision, passes one or two licensing exams, and then is made a scientist. What is more important than espousing an identity is robustly embodying it through reliable means of indoctrination (and selection). I would contend that in some cases professional psychology has not yet earned the right to say that it has unique value. This is not to say that it lacks value altogether, but to say that it must ensure it possesses unique value and, even more importantly, responsible and reliable value. For society to trust our profession, we should demonstrate our trustworthiness. Part of this is, as above, through proof, not rhetoric. Part of it, I would argue, is through the demonstration and explicit use of sensible mechanisms of action in all training and regulatory stages. We must train in a way that makes our clinicians robustly scientific; we must regulate to at least minimally ensure that it is so.

More important than identity is the imperative of good practice. This is to say that despite arguments about what our identity is or ought to be, what stands as more demonstrably important

is that we produce and regulate effective clinicians. Or, if we do not want to be maximally effective, that we at least avoid unnecessary harm. Even if our identity did not include a scientific foundation, we should have one. We should have this foundation not because it declares our purported virtue, but because it actually makes us virtuous. A scientific foundation can, through empirical efforts, better ensure our effectiveness, or at least prevent us, as much as possible, from causing harm. In other words, a scientific foundation can encourage maximally rigorous efforts to produce and maintain competence.

Limitations and Future Directions

This study relied on two self-developed scales. Factor analyses demonstrated limitations in interpreting these scales as measuring singular constructs (i.e., as having construct validity). Undoubtedly, the inability to use Item Response Theory due to a failure of unidimensionality and the clear evidence that the construct was multidimensional in some unpredictable ways deserves serious consideration. The scale analyses did not indicate discrete constructs as expected, meaning that both the attitude and critical thinking scales are contaminated by non-relevant factors and thus, conclusions reached using these scales must be considered limited and tentative. Moreover, relying on Cronbach's alpha as a measure of reliability, even though the alpha levels were "good" (Field, 2013) for both, is errant in that alpha also requires unidimensionality and can be artificially high (Schmitt, 1996). Thus, there is no claim that the scales used demonstrate good internal consistency as per their alpha levels. However, the Cronbach alpha results for the SIP attitude and SIP critical thinking scales *do* indicate some level of items "hanging together" despite the multidimensionality present.

Much work can be done to create more robust measurement tools that could lead to stronger conclusions. However, despite these limitations, the scale development process was

itself robust and deserves reconsideration for the strong foundation it provided. In other words, despite the problematic factor analysis results and failure to use Item Response Theory, the scales were made meaningful and useful in other ways worth emphasizing.

To start, a strong rationale for my survey was the initial SIP "theory" upon which it was based. This involved an extensive literature review and years of reading about science and SIP topics. Using this literature as a foundation, I created a concept map to delineate subcomponents of SIP. From this concept map, I developed questions targeted at very specific areas of SIP. After developing the survey questions, I sought robust feedback from multiple sources including peers in a survey development class, expert reviewers, and psychologists who either completed the survey pilot test or who engaged in think-alouds about the survey questions. In other words, extensive work was done to attempt to produce a robust instrument. Still, this research included some unmet goals and some limitations, and in hindsight a different approach could have produced a better instrument. As a result, results should be interpreted cautiously. On the other hand, multidimensional constructs are not without merit, and this research remains a robust endeavour that doggedly stumbled toward serious science.

Truly, any research in the realm of SIP competencies is presently limited by the state of the science. SIP is a relatively novel construct and organizing its subcomponents is a work in progress. SIP is also a broad concept, incorporating a wide variety of skills, attitudes, behaviours, and knowledge. Capturing that breadth is difficult, and capturing any one element is inevitably challenging in another way. These complexities can easily lead to over-ambition in wanting to understand many parts of something (or the whole thing) instead of starting with just one component. Despite the attempt to limit this research to a few areas of SIP, it was ambitious, resulting in an unhelpful level of complexity. To focus exclusively on one discrete element of

SIP might be more fruitful, at least in terms of producing more straightforward results.

An unfortunate limitation of this research is the inability to parse out training elements more specifically. Respondents provided demographic information that was meant to clarify the levels of science-informed training undertaken (including self-study) so that a more nuanced variable could be included in the model. However, these data were not effective in their capture, predominantly because of the response options provided and the difficulty translating the responses into meaningful (and sufficiently comparable) data points. It would be useful to understand how someone's own independent study or the extent of their engagement in specific scientific courses might (or might not) be associated with critical thinking skills or SIP attitudes. Unfortunately, this measure could not do that.

Relatedly, this research was intended to be a mixed methods study wherein much more information could have been garnered from follow-up interviews and data integration. Exploring and comparing the opinions and formative experiences of clinicians high or low in critical thinking could greatly extend our knowledge in this subject area and clarify survey results. Mixing survey and interview data could provide robust answers to the research questions. This research would still be valuable.

Demographically, Albertan clinicians were over-represented, and that over-representation may have introduced bias into the results. Alberta is similar to some other jurisdictions across Canada in permitting registration at the master's level, but Alberta also has reduced requirements in terms of supervised practice hours compared to some other jurisdictions (CPA, 2023). These differences may impact SIP levels. In the same sense, a larger sample size would help make the research more robust. While the sample size was good, it was not the intended 379.

An important limitation to note is the difficulty in discussing Canadian professional

psychology as a whole. Each jurisdiction is unique in several ways and generalizations are not possible. My own exposure to a "psychological counselling" graduate program in the United States, a counselling psychology graduate program in Newfoundland and Labrador, and another counselling psychology graduate program in Alberta all colour my motivations, beliefs, and interpretations. My work as a regulator also comes into play. By nature of being Albertan and evolving primarily in the Albertan professional psychology context, I naturally see things in a way that is likely not matched in other jurisdictions. For example, Alberta seems to have more overlap between counsellors and counselling psychologists because of popular training programs and regulatory standards. Most of all, my own confirmation bias is surely to credit for some degree of alarm I carry. I am more likely to notice and remember unscientific than scientific practice.

Another substantial limitation of this research is its correlational nature. We cannot ascertain the direction of effect between variables, leaving us with many unanswered questions. It is important to know that differences exist between clinicians in the sample. It would be even better to have a clearer idea of why.

An inherent challenge to this research, especially its recommendations, is the ongoing ontological and epistemological war (Tavris, 2015). Does the profession elect science as a core value and guiding principle or not, and who decides? This debate is unlikely to produce an easy or definitive resolution. However, this study is another step toward continuing the dialogue in hopes that the core of our practices and our identities become clearer and come to rely, as much as possible, on empirical data.

This research resoundingly emphasizes the need for more research. More efforts toward developing critical thinking skills assessment tools specific to professional psychology are

needed. After that, we need to create additional assessment tools to cover other aspects of SIP. With these assessment tools, we could continue to assess clinicians across the country, measuring their scientific competence against various other variables of interest. We could also continue to compare professional psychologists to adjacent professions (such as clinical social work).

It is important to mention the difficulty faced in scale development in this study as it relates to future endeavours. First, we should prevail in attempting to measure these important SIP constructs *in spite of* their complexity, and as determined efforts toward SIP itself. Second, to measure these constructs well and to reduce the complexity as much as possible, follow-up research should focus on more discrete, perhaps "singular," aspects of SIP. It seems to me that attitudes are exceedingly important to measure well, specifically scientific attitudes as they relate to professional psychology. Likewise, critical thinking skills specific to professional psychology are without a doubt in need of sophisticated measurement. It cannot be emphasized enough how important are the efforts toward legitimate measurement (such as using measurement theory) in these endeavours.

Ultimately, what seems the most important is to create a robust assessment tool for minimal scientific literacy, something that can be used to measure the minimum acceptable standard. The EPPP Part 1 (Knowledge), used in virtually all North American jurisdictions, provides a somewhat similar function, but it is entirely knowledge-based. As a result of the EPPP Part 1's exclusive focus, the Association of State and Provincial Psychology Boards (ASPPB, 2023) have developed the EPPP Part 2, a skills-based exam meant to assess competencies in professional psychology. This exam contains, among other content areas, items regarding "scientific orientation" and skills in the realm of critical thinking (Pearson VUE, 2016).

However, its intent is somewhat different, and it contains many other knowledge and rules-based questions (e.g., components of CBT, ethical dilemmas). The EPPP Part 2 is only required by seven North American jurisdictions at this time (ASPPB, 2023), although it is soon to be required by more. This exam seems like a good effort toward better skills-based assessments, although it should be closely reviewed to assess overlap between SIP components and EPPP Part 2 content areas.

Even more importantly, our training programs and training-focused researchers should invest in research about skills of practitioners before and after training, specific to SIP. These researchers should also study the mechanisms of training to see which are resulting in desired competencies. Then, the degree to which competence is maintained across one's career is another matter. We might start out as science-informed, but we must also determine the mechanisms for continued SIP.

In addition, the role of professional identity in influencing practice culture is an important SIP component to consider. To this end, more research could be done to better assess practitioner identity, training institution identity, regulatory college identity, inculcation efforts along the way, and relationships between identity and practice. Clarifying professional identity is important for establishing the needs of the profession, its scope, and for informing legitimate consent with clients (Sinacore, 2015; Young & Lalande, 2011).

Implications

A major implication of this research is the need for greater professional accountability. We do not know enough about our professionals and our training systems, and it behooves us to improve our measurement of both. Such measurement may ultimately assist us in improving how we train professionals and regulate the profession. Efforts toward clarifying the state of practice

and training could also help the profession correctly advertise itself to the public. The broadest implication in these senses is for professional psychology to prove itself, both theoretically and through actuarial evidence. Professional psychology could lay out the mechanisms it supposes it uses to train and regulate psychologists to be sufficiently scientific. Then, it could investigate the reality of each one. This research implies that it should.

At the association level, tentative implications might call for reviews of professional identity statements to amend claims about scientific allegiance. Associations might also support efforts to further clarify identity (through research) and encourage transparency of professional approaches. Given it is the Canadian Psychological Association that publishes the *Code of Ethics* adopted by almost all jurisdictions in Canada, this research suggests the importance of reviewing these codes regarding SIP imperatives, particularly in terms of providing more fulsome definitions of SIP (and notions of the "scientist" and "scientist-practitioner"). The language in the current code is vague about science and even problematic in places. While the CPA had a taskforce regarding EBP, in our *post-truth* world CPA could have a taskforce on SIP that produces both a statement and recommendations for amendments to the code. (On the other hand, CPA could reconsider and implement the recommendations by the previous EBP CPA taskforce.) The code simply does not say enough about scientific imperatives.

Graduate training directors might closely consider SIP elements and review their programs to determine training coverage (especially critical thinking). Training programs could be more explicit about the evidence upon which their admissions process and training components are based. The present research strongly implies the need for graduate programs to establish clear indicators of successful training (e.g., competency benchmarks) and robust means of outcome monitoring related to scientific literacy. Graduate programs should engage in pre-

and post-testing to assess their students and their progress. Such practices would amount to feedback-informed training, akin to feedback-informed treatment, placing accountability and measurement of change at the forefront. How else can training programs know that they are achieving their goals? As per the complexity of the scientist-practitioner model, embracing a more straightforward model of SIP will likely be better for capturing a wider audience and for clarifying the purpose and intent of such a foundation.

Supervised practice is usually a bridge between training and regulation; it also stands as a major source of attitudes and practice (e.g., Cook et al., 2009; Safran et al., 2011). Considering that clinicians seem to prefer to rely on consultation, supervision, and other similar social forms of influence, we should invest more in making supervision a robust process of scientific inculcation. This likely involves making supervisors more obligated to be informed by science. Thus, both training programs and regulators could consider how to better ensure such obligations.

Regulatory bodies could incorporate stronger scientific training mechanisms as required for initial registration (e.g., number or types of courses taken, grades achieved, acceptable programs from which an applicant must graduate). Regulators could also ensure science-informed continuing competence requirements through stricter regulation of continuing education credits, perhaps even including required training in critical thinking skills. Considering that it is the regulators' chief responsibility to protect the public, they could also do more to inform clients, perhaps through a "checklist," of science-informed components clients might look for in therapy. Finally, the debate between the doctoral- or master's-level registration minimum has not been settled; if regulators are willing to expose clients to master's-level clinicians who may be less prepared to be science-informed, either clients need to be given this

information (perhaps through a title change or caveat on practice) or registration requirements should be amended. In other words, to reach minimally acceptable practice levels, perhaps master's-level practitioners must demonstrate competence in some added way. Some jurisdictions require additional supervised practice for master's-level clinicians. This added requirement may go some distance toward establishing "equivalence," but the mechanism should be clarified and demonstrated to have meaningful effects.

Implications for psychologists and counsellors include reflection on professional identity as it relates to SIP and elements that may run counter to that practice. Clinicians can investigate their own strategies for mitigating problematic biases and heuristics, enhancing data-based or actuarial decision-making, keeping up to date on relevant research, and clarifying their own typical proclivities for clinical decision-making. Endeavouring to be more scientific need not demand perfection or strip the clinical encounter of its humanity. Rather, these endeavours are opportunities for improvement. Clinicians might also consider the rhetoric they repeat and upon what basis and to what end. We likely cannot overstate the importance of mindfulness about the influence we have on colleagues and future professionals.

Conclusion

From the position of best and most competent practice, clinicians ought to inform their practice with science. Science involves critical inquiry, or best efforts to remove bias from our knowledge and practice. Psychologists can be more scientific in a multitude of ways, essentially improving their clinical judgment with the use of various measurement tools, bias-mitigation strategies, and science-based foundational and practice knowledge. Such efforts at being scientific should improve public confidence in the profession and, more importantly, treatment safety and benefits. Because little is known about the state of SIP in Canadian professional

psychology, this research was born. This study tentatively demonstrated differences between certain types of clinicians in the Canadian context, suggesting that some are more science-informed than others. Such differences suggest the need for further research to establish effective selection, training, and regulation practices and to continue to improve the state of scientific practice in Canada.

This research suggests some promise both in terms of science-positive attitudes among Canadian clinicians, and in terms of many knowledge and skills-based areas in which the majority of clinicians appear to be science-based. On the other hand, some areas of SIP are poorly adopted or implemented, with unscientific notions being rampant. In some cases, even a minority of clinicians endorsing unscientific practices may be cause for concern. Although clinical psychologists or doctoral-level psychologists might be satisfied with their group's average performance relative to other professional groups, an average percentage score in the low seventies on a test of critical thinking remains something upon which to reflect seriously. It behooves us to ask ourselves what is good enough for our identity as scientist-practitioners, for our profession, and, most of all, for our clients. Overall, SIP in Canadian professional psychology seems mixed.

Ultimately, the state of the profession's scientific cogency is still woefully unknown. This insufficiency is especially troublesome when considering the level of self-awareness that ought to be present in a self-governing profession that treats vulnerable people and provides a public good. There is much more to be done.

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Appendix A: Survey Invitation

How biased is our clinical decision-making?

Dear psychologists and counsellors,

Please complete our survey about **clinical decision-making** and **bias** in Canadian professional psychology! This research is important for understanding our profession and for informing training and regulation.

If you completed graduate studies in counselling, counselling psychology, or clinical psychology and have worked with clients for at least one year total, your participation in this survey would be greatly appreciated! The anonymous survey should take about **20-25 minutes**. This study has been approved by the University of Alberta Research Ethics Board 2 (Pro00110343).

Please find the survey (and more information) here: https://bit.ly/CDMinPP
(The survey is also available in French.)

Thank you kindly!
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Dans quelle mesure nos décisions cliniques sont-elles biaisées ?

Chers psychologues et conseillers,

Veuillez répondre à notre enquête sur **la prise de décision clinique** et **les préjugés** dans la psychologie professionnelle Canadienne! Cette recherche est importante pour comprendre notre profession et pour éclairer la formation et le règlement.

Si vous avez terminé des études supérieures en counseling, en psychologie du counseling, ou en psychologie clinique et que vous avez travaillé avec des clients pendant au moins un an au total, votre participation à cette enquête serait grandement appréciée! L'enquête anonyme devrait prendre environ **20 minutes**. Cette étude a été approuvée par le comité d'éthique de la recherche de l'Université d'Alberta (Pro00110343).

Veuillez trouver l'enquête (et plus d'informations) ici: https://bit.ly/FCDMCPP

Merci beaucoup !
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Appendix B: Pseudoscience, Illogic, and Bias Components

Components of Pseudoscience, Illogic, and Bias Relevant to SIP

	COMPONENT	Explanation/Definition
Pseudoscience	Ad hoc hypotheses	Self-sealing; patching up inconsistencies with justifications after the fact
	Absence of self-correction	Marked by intellectual stagnation; dismissing opportunities for feedback or new knowledge
	Evasion of peer review	Avoiding peer review
	Confirmation rather than refutation	Seeking to prove oneself or one's hypothesis right instead of proving it wrong
	Reversed burden of proof	Burden of proof *should* rest on claimant, not critic; in reversal, claimant requests proof, often against their own assertion, from critic. e.g., claiming something is correct because of a lack of compelling evidence against it
	Absence of Connectivity	Lack of connection to other scientific disciplines; content violates basic science / established laws; lacking scientific plausibility
	Overreliance on testimonial and anecdotal evidence	Using unsystematic anecdotes as good evidence; e.g., case reports, personal anecdote
	Use of obscurantist language	Using impressive sounding, highly technical jargon or scientific sounding rationales
	Absence of boundary conditions	Operating across an exceedingly wide range of conditions
	The mantra of holism	Explaining away negative findings via pleading for more context or understanding; asserting that a scientific claim cannot be judged in isolation
Logical Fallacies	Appeal to popularity	Legitimacy via commonality, wide use, or being well-regarded
	Appeal to antiquity	Legitimacy via something being old or around a long time
	Argument from authority	Legitimacy via leadership / authority endorsement
	Post Hoc Ergo Propter Hoc	"One thing comes after another" meaning first is causal
	Tu Quoque	"You too"; tit for tat; defensiveness by retaliatory identical claim
	Ad hominem	Attacking a person outside their claims (such as personal attacks)
	Confusing currently unexplained with unexplainable	Because we don't currently understand something, we thus *cannot* understand it
	Appeal to Nature	Being "natural" makes something better or more virtuous than unnatural
	CSTEs (causes of spurious therapeutic effectiveness)	Expectancy effects, spontaneous remission, regression to the mean, effort justification, multiple treatment interference

Biases	Availability heuristic	Being influenced by most available, memorable, or recent information; mistaking something memorable for something probably, typical, or important
	Confirmatory bias	Tendency to seek out, attend to, or remember information that supports a specific belief
	Hindsight bias	Tendency to explain events based on outcomes learned after the fact, especially believing something more likely because it happened
	Illusory correlation	Believing events to be correlated when they are not or are only weakly correlated
	In-group bias	Holding more favorable biases to one's own group
	Projection bias	Assuming other people think like you do

Appendix C: Survey Part One Meta-Data

Survey Part 1 (Skills & Knowledge) Meta-Data

	QUESTION		SIP Construct Component
Section 1 – James & Jo	**5.1 – 5.8**	Justifications for Treatment	Critical Thinking Skills – Logical fallacies (e.g., argument from authority, "antiquity," popularity, anecdote) Scientific Practice Knowledge – common factors, available evidence
	6	Repressed & Recovered Memories	Foundational Knowledge – cognitive science (memory & emotions) Critical Thinking Skills – awareness of pseudoscience (absence of connectivity; possible obscurantist language)
	7.1 – 7.6	Response to Invitation to Seek Counter Evidence	Critical Thinking Skills – awareness of pseudoscience (evasion of peer review, absence of self-correction, confirmation not refutation, mantra of holism, burden of proof reversal, naïve realism) + science as "biased" attitudes
	8.1 – 8.7	Progress Monitoring Rationale	Critical Thinking Skills – causes of spurious effectiveness (CSETs), naïve realism, holism illusion Scientific Practice Knowledge – assessment (actuarial vs clinical judgment)
	9	Treatment is Good for Everything	Critical Thinking Skills – detection of pseudoscience (absence of boundary conditions)
	10.1 – 10.6	Rate the Bias/Problems	Critical Thinking Skills – bias detection (availability heuristic, confirmatory bias); pseudoscience detection (obscurantist language, absence of connectivity) Research Literacy Knowledge – evidence hierarchy
Section 2 – Daniel & Alex	**11.1 – 11.6**	Diagnosis Decision-Making	Scientific Practice Knowledge – assessment (actuarial vs clinical judgment; reliance on "intuition") Critical Thinking Skills – intuition preference, mantra of holism, experience fallacy
	12.1 – 12.5	Diagnosis Knowledge and Attitudes	Scientific Practice Knowledge – diagnosis (DSM knowledge) (+attitudes/common beliefs)
	13.1 – 13.6	Justifications re: Pseudoscientific Treatment	Critical Thinking Skills – awareness of pseudoscience (acupuncture/energy healing); (faulty) position of "not knowing" and letting client decide. Foundational Knowledge – scientific mechanisms (acupuncture/CAM) & scientific plausibility Scientific Practice Knowledge – placebo effects (i.e., extra-therapeutic effects); evidence-based treatment; approach to therapy as person-centred/client affirming even if violating SIP model* (*attitude embedded).

14.1 – 14.6	Psychopathology Development	Foundational Knowledge – genetics; abnormal psychology Critical Thinking Skills – statistical errors (most vs some); pop psych trap/negativity bias; childhood origin/environmental fallacy
15.1 – 15.6	Justifications re: Career Assessment	Scientific Practice Knowledge – psychometrics; assessment Critical Thinking Skills – pseudoscience detection (mantra of holism)
16	Explanations for Change	Scientific Practice Knowledge – predictors of outcomes; evidence-based treatment (also assesses preferences re: most important factors in therapy)
17	Most Convincing Progress Evidence	Scientific Practice Knowledge – assessment best practices (outcome monitoring; actuarial vs clinical/intuition) Critical Thinking Skills – naïve realism detection

Appendix D: Pilot Study Details

Think-Alouds

I made multiple wording changes throughout the survey based on these think-alouds, often when someone would explain out loud that they were interpreting a word or sentence in a way I did not mean it to be interpreted. I also altered quite a few items to distill them down to the specific indicator. For example, I would notice that a person would (or would not) endorse an item because of a relatively extraneous factor (such as whether the article cited was peer reviewed), instead of the factor I was assessing (such as the pseudoscience of energy therapy). I also added some items and took others away based on what interviewees said. For example, one person said they would not endorse the items present but would endorse a hypothetical item. Thus, I added this item afterward because it covered an element of pseudoscience that I had not included that the respondent would have endorsed.

Across the think-alouds, interesting issues arose with questions asking about therapeutic elements to which not all therapists are exposed (e.g., substance abuse treatment, career counselling). I had been concerned from the start that the survey was too specific in these ways, and I saw through the think-alouds that responses were impacted in various ways when the respondent was unfamiliar. It seemed to introduce other bias into the responses. Initially, I clarified some of these items and changed response items, but later I replaced the items almost entirely (see Expert Reviews).

Aside from changes to my survey, the think-alouds helped me generate more explanations for certain response patterns. For example, if a respondent indicated that they would choose an incorrect (non-SIP) item, I could hear their explanation as to why. I noted these to help with later interpretation.

Expert Reviews

Due to space constraints, I have not included all the changes made based on expert reviews. In summary, I changed wording, response options, and whole questions. Importantly, all expert reviewers had positive feedback about the survey and thought it was assessing the intended constructs. They also thought the concept map was fair. Since my first expert reviewer is also a substance abuse expert, he had many suggestions to strengthen the questions about this topic area. I made substantial changes here before deciding to remove these questions altogether.

Both the second and third expert reviewers were concerned about the specificity of the career counselling and substance abuse questions, and it was after discussion with the third reviewer that I finally decided to change the second scenario. This scenario originally focused on substance abuse and career, but I changed it to focus on depression and career. I kept career because it only comprised one question, and because these reviewers, being clinical psychologists, are likely less inclined to see the question as useful as compared to counselling psychologists and counsellors. However, I added back in an *I don't know* option to this question to get clearer answers from respondents (this need became obvious across almost all testing).

Interestingly, my second reviewer disagreed with one of my questions (about factors that most account for client change). The second reviewer drew my attention to some controversy regarding the research in this area and thought this question was not science-based. I altered it to account for this new information. The issue raised here highlighted the difficulty with consensus and robust science in this field and thus in my survey.

Based on my third reviewer's feedback, I overhauled the second scenario. I added a question about acupuncture as an adjunct treatment for depression, and I changed some questions to be about depression instead of substance abuse. I also separated the first question into two

different questions after his feedback that there was too much going on in the original question.

Based on my academic supervisor's feedback, I changed the gender of the psychologist in the second scenario as my supervisor wondered if her being female would lead to harsher judgment and confound my results. Thus, both psychologists are now male to avoid gender effects. In discussing some items with my supervisor, I also changed some language for clarity and decided to remove a response option from one question that did not seem sufficiently useful for distinguishing SIP from non-SIP.

Pilot Study

SurveyMonkey provides helpful initial analyses, indicating that the typical time spent on the survey was 25 minutes. I also reviewed the frequency of responses in *SurveyMonkey*-provided visualizations.

In reviewing response patterns in the vignette-based section of the survey, the survey appeared to be performing well. There were many non-SIP items that were endorsed at meaningful rates (i.e., at least above 5%, and many quite a bit higher). There were some options that were not being endorsed at all; for those I altered the wording on the item stem to induce responses across the full spectrum. In some cases, it can be appropriate that items are not endorsed at all (and informationally important). Thus, those were unchanged. In other cases, I reduced options or changed wording.

I changed one question (the last of the second scenario; question 17) quite significantly. It required the respondent to select the two best answers, a structure I had questioned. I changed it to a single selection and reduced the options. I removed the options that were chosen less frequently (although, two of those were still chosen by 15% of respondents). However, I thought this question would produce cleaner data if respondents were forced to choose their single best

answer instead of muddying the water with two. After experts review, I had previously changed the question 16 for similar reasons (i.e., it was also a "choose two" that I reduced to one). Furthermore, respondents still endorsed non-SIP response options for this last question, so I expected that it would still perform well with the single selection option.

The attitude section of the survey proved more difficult, with most items being negatively skewed (i.e., answers clustered at the affirmative end, since most people endorsed desirable attitudes). On many items, very few (or no) people disagreed strongly and few people disagreed. As the attitude section was less important to me, I did not alter it in response to this.

As for the demographics section, I noticed no issues. It seemed to be gathering information about respondents successfully. I have only changed that section (minorly) based on expert reviews.

Final Thoughts

My survey evolved greatly throughout pilot testing and reviews. The think-alouds assisted in interpreting some response patterns and highlighted the importance of added future inquiry (e.g., follow-up interviews). The survey seemed to be performing in the way I had intended, and some participants commented that it was more enjoyable than most surveys and even "fun."

Appendix E: English Science-Informed Practice and Demographics Survey

[SURVEY START]

Hello!

Thank you for being here. This survey explores **approaches to clinical decision-making** in Canadian professional psychology (counselling psychology, clinical psychology, counselling, etc.).

In the first section, the survey presents hypothetical scenarios about two psychotherapists. You will be asked to rate each therapist's decision making. In the final sections, you will be asked questions about your own work-related attitudes and your background. We hope to use the results to better understand our profession, especially regarding training and policy needs.

This survey may take you approximately 20-25 minutes.

This survey is anonymous, and you can exit at any time.

The plan for this study has been reviewed by a Research Ethics Board at the University of Alberta (Pro00110343). If you have any questions regarding your rights as a research participant or how the research is being conducted, you may contact the Research Ethics Office at 780-492-2615.

The full Information Letter and Consent Form can be found here: http://bit.ly/3rCTPDD

If you have any questions, please contact Heather Gower (hgower@ualberta.ca).

Thank you for your time!

Sincerely,
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Principle Investigator
Counselling Psychology Doctoral Candidate
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* 1. I agree to participate in the research study described above.
- o Yes
- o No

[new page]
[INCLUSION/EXCLUSION QUESTIONS]

First, let's make sure you're a good fit for this survey!

* 2. Was your graduate education in counselling, counselling psychology, clinical psychology, or a very close equivalent (e.g., "psychological counselling")?
    - o Yes
    - o No

* 3. Are you currently a psychologist, provisional psychologist, psychological associate, registered psychotherapist, certified counsellor, or something very similar*?
*psychologist candidate, psychologist in supervised practice, resident, interim member, counselling therapist, or similar, and registered or certified with a professional body.
    - o Yes
    - o No

* 4. As a registered, licensed, or certified professional, have you seen clients for treatment or assessment for at least one year in <u>total</u>?
    - o Yes
    - o No

[*Required question]

[new page]
[PART I - Knowledge & Skills]

Let's get started!

In this section, you will read a hypothetical scenario about a therapist and their client. After each brief description, you will answer a question. *You do not need to recall information from one question to answer later questions.*

This survey is anonymous and your honest responses are appreciated. Please choose the answers that truly fit with your perspective to help us better understand our profession.

Please note that the term "therapist" is used at times to capture all relevant kinds of mental health workers (psychologists, counsellors, etc.). Likewise, the term "client" is used but can be substituted for "patient".

[new page]
[SCENARIO 1 – James & Jo]

James is a mid-career therapist working in a busy private practice. He has recently started seeing Jo, a 24-year-old client who has been struggling with symptoms of depression. During their first session, Jo discloses having had a hard childhood, including emotional and physical abuse from her parents. James recently attended an in-depth course where he learned a treatment for trauma.

He wants to try this treatment with Jo. When he explains the therapy to Jo, she likes the sound of it.

5. How strongly would you rate each of the following as possible **justifications** for James selecting this treatment? You should consider each justification independently.

(Response options: *Not at all justifiable, Slightly justifiable, Moderately justifiable, Very justifiable*)

5.1 As long as Jo and James have a good relationship, the treatment will probably work.
5.2 The treatment is used by a majority of therapists.
5.3 The course James took provided multiple true case studies of clients improving after receiving the treatment.
5.4 The treatment has been around for many decades.
5.5 The treatment is endorsed by a major professional psychology association.
5.6 The developer of the treatment is a well-known name in the field.
5.7 Since Jo likes the sound of the treatment and consents, he can go ahead with it.
5.8 All treatments are equally effective.

[new page]

In the third session, Jo explains that sometimes she thinks she has forgotten some of the worst abuse from her childhood and that these memories are slowly coming back since starting therapy. James tells Jo that memories can be judged as more likely true if they evoke vivid emotions and strong physiological responses.

6. To what extent do you agree or disagree with James' explanation?

(Response options: *Strongly Disagree, Disagree, Agree, Strongly Agree*)

[new page]

When James is telling a colleague about the new treatment he is trying, the colleague asks James if he has looked up some of the evidence or writing that goes *against* the treatment, since the colleague has heard some controversy surrounding it.

7. How **true** or **legitimate** are the following responses that James might give to his colleague? You should evaluate each response <u>independently</u>.

(Response options: *Very False/Illegitimate, Somewhat False/Illegitimate, Somewhat True/Legitimate, Very True/Legitimate*)

7.1 He is more interested in paying attention to signs that the treatment is working with Jo, rather than seeking out evidence against it.
7.2 He has seen Jo improving, and that is sufficient evidence.

7.3 General research sources won't help him understand if the treatment works for his specific client.
7.4 Research provides little practical use.
7.5 Science is biased and too easily dismisses what isn't part of the dominant paradigm.
7.6 He has seen no proof that the treatment is ineffective, so he will carry on.
7.7 Science is biased and too easily dismisses what isn't part of the dominant paradigm.
7.8 Until someone proves that the treatment doesn't work, he should ignore the criticism.

[new page]

A colleague asks James if he is using any kind of objective progress monitoring with Jo to see if she is improving (e.g., feedback informed treatment, regular questionnaires to assess progress and outcomes, etc.). James explains that he finds it hard to find good tools, so instead he does regular check-ins with her and asks about her symptoms to measure progress.

8. From the list below, choose all of the ways James can fairly justify his choices regarding progress monitoring. Check **all** that apply or *check none of the above* if none of the options can justify James' choice.
8.1 Most clients can tell if therapy is helping them, so he can ask Jo.
8.2 If Jo is improving while in therapy, it is likely because of the therapy.
8.3 Multiple case studies show that this is an effective treatment, so objective progress monitoring isn't really necessary.
8.4 James can holistically understand Jo's progress, so he doesn't need progress monitoring scales.
8.5 Most therapists are good at telling if their clients are improving.
8.6 Progress monitoring takes up too much precious therapy time.
8.7 *None of the above* are fair justifications.

[new page]

James finds a quote by a central proponent of the treatment, suggesting that the treatment is widely applicable and very effective. This proponent says that there is evidence that the treatment works well for trauma, depression, anxiety, obsessions, phobias, addictive urges, compulsions, grief/loss, eating disorders, and a variety of other problems.

9. How should this information change James' confidence in the treatment?
- It should make him **less** confident.
- It should not affect his confidence.
- It should make him **more** confident.

[new page]

James is aware that biased ways of thinking can get in the way of clinical work.

10. Please rate the extent to which each of the following are *biased* or *potentially problematic*.

(Response options: *Very problematic or biased; Somewhat problematic or biased; Somewhat reasonable or unbiased; Very reasonable or unbiased*)

10.1 James finds a meta-analysis/systematic review showing good outcomes from this treatment.
10.2 James finds a randomized controlled trial demonstrating significant changes in client functioning after receiving the treatment.
10.3 James finds an article explaining that the treatment works partly by retraining the body and mind to work at an ideal energetic frequency since trauma can throw off our internal balance and weaken the immune system.
10.4 In order to calm his fears about if the treatment works, James searches for and finds several peer-reviewed articles by the creator of the treatment claiming good effectiveness.
10.5 James finds an article explaining that this therapy works in part by concentrating one's thoughts on affirmations and visualizations to cause changes in the physical world.
10.6 James' colleague tells him about several memorable clients who were helped a lot by this treatment.

[new page]

Let's keep going!
This section is like the last, but with a <u>new therapist and client</u>. Remember: You do not need to recall information from one question to answer later questions.

[new page]
[SCENARIO 2 – Daniel & Alex]

Daniel (a mid-career therapist) has just started seeing a new client, Alex. Alex has concerns about depressive symptoms and is also struggling with his job, two concerns Daniel has worked with successfully in the past.

Daniel does an intake interview and also assesses Alex's depressive symptoms using a well-established questionnaire.

11. How should Daniel balance information from the questionnaire and the interview? Check **all** that apply or check *none of the above* if none of the options are acceptable.
11.1 Clinical intuition should be prioritized over questionnaire results.
11.2 If he used structured diagnostic interviewing, Daniel should be concerned about discrepancies between the interview and questionnaire results.
11.3 Clinicians should focus on their holistic understanding of clients, not on questionnaire results.
11.4 Daniel has quite a bit of experience with depression and can trust his judgments.
11.5 Daniel's clinical judgments can be strengthened further with the use of multiple robust questionnaires.
11.6 *None of the above* are acceptable.

[new page]

Upon reviewing the results, the questionnaire suggests that Alex has symptoms very consistent with Major Depressive Disorder (MDD). However, in the interview, Daniel finds that while Alex endorses most other criteria for an MDD diagnosis, he indicates no loss of interest or pleasure, no issues with sleep or appetite, and no suicidal ideation. Based on this information, Daniel is not convinced that Alex has MDD.

12. Regarding diagnosis, which of the following statements should Daniel endorse? Check **all** that apply or check *none of the above* if none of the options are agreeable.
    - 12.1 Alex does not meet the criteria for MDD since he has no loss of pleasure, no sleep or appetite issues, and no suicidal ideation.
    - 12.2 Even if Alex meets the criteria for Major Depressive Disorder, diagnoses are often unhelpful.
    - 12.3 Diagnoses can be stigmatizing, so it is better to avoid the label.
    - 12.4 Diagnosis is part of the medical model and should be de-emphasized.
    - 12.5 *None of the above*.

[new page]

While exploring coping strategies for his depressive symptoms, Alex shares that he has found acupuncture to be helpful in the past. Alex asks Daniel what he thinks about using acupuncture alongside psychotherapy.

13. Which of the following are justifiable responses? Check **all** that apply or check *none of the above* if none are justifiable.
    - 13.1 There is not enough evidence to say if acupuncture does or does not help with depression, so Daniel should refrain from judgment.
    - 13.2 Acupuncture may help because of "placebo" or more general therapeutic effects, so Daniel could provide some psychoeducation about this.
    - 13.3 Acupuncture is not a science-based approach and Daniel should not endorse it.
    - 13.4 Daniel should affirm the client's perspective about what works for him, supporting Alex's use of acupuncture.
    - 13.5 If Alex has found acupuncture helpful, then this is a treatment that Daniel can support.
    - 13.6 *None of the above* are justifiable responses.

[new page]

Alex explains that his mother also struggled with depression and asks Daniel if this has something to do with his own struggles. Daniel says that this family history likely plays a part and provides psychoeducation about family patterns and heritability.

14. Which of the following reasons would justify Daniel's answer to Alex's question? Check **all** that apply or check *none of the above* if none can justify his answer.

14.1 There is good evidence that most adult children of depressed parents show insecure attachment.
14.2 Depression is often a result of trauma.
14.3 Depressive disorders typically have a genetic component.
14.4 Most psychological problems have something to do with childhood events.
14.5 Most children of parents with depression also have depression.
14.6 *None of the above* can justify his answer.

[new page]

Later in treatment, Alex wants to focus on his concerns about work. He doesn't like his job and thinks it has never really been a good fit for him. Daniel has Alex complete the Myers-Briggs Type Indicator (MBTI) and the Strong Interest Inventory (SII).

15. How can Daniel justify his approach at this stage? Check **all** that apply or check *none of the above* if none can justify his answer.
15.1 The MBTI has good reliability and validity.
15.2 The SII has good reliability and validity.
15.3 I am unsure of the reliability and validity of the MBTI and/or the SII.
15.4 Even if they are less reliable, assessment tools can be useful as long as there is context to interpret results holistically.
15.5 If these instruments are reliable, then using them is better than using talk therapy alone.
15.6 *None of the above* justify his approach.

[new page]

After 20 sessions, Alex reports very few issues with depressive symptoms and increasing reliance on new coping strategies. He has also been able to generate a plan for exploring other career options and feels good about his work with Daniel.

16. From the list below, choose the **best** or **most likely** explanation for Alex's progress in therapy. You should consider the following statements as true about Alex and Daniel regardless of the information provided in this scenario so far.
- Alex and Daniel established a very strong therapeutic alliance.
- Daniel used a leading treatment for depressive disorders.
- Alex had positive expectations for therapy and relatively low levels of distress at intake.
- Daniel is empathic and warm in his approach to clients.
- I am unaware of process/outcome research, so I don't know which of these are the best answer.
- Much of the process/outcome research has methodological issues, so this question cannot be fairly answered.

17. Which of the following should **most** convince Daniel that Alex has indeed improved significantly?

- Alex tells Daniel that he experiences very few depressive symptoms and has much clearer direction in his career.
- Outcome measurements show that Alex's distress levels have decreased and that his functioning has improved over the course of therapy.
- Daniel notices that Alex seems happier, less guarded, and more aware of his problematic coping styles.
- During a termination session, Alex reflects positively on all he has learned, clearly reviewing his gains in knowledge and skills.

[new page]

[PART 2 - Attitudes]

Great! Thank you for answering those questions. The rest of the survey is about you!

This brief set of questions is about how you approach your work with clients.

Please indicate the degree to which you disagree or agree with the following statements.

(Response options: *Strongly Disagree / Disagree / Agree / Strongly Agree*)

18.1 To improve, it is necessary that I question my actions and decisions.
18.2 I remain skeptical of my clinical decision-making.
18.3 I am regularly wrong about things, even when I feel like I'm right.
18.4 If I work with a client for long enough, I will develop a nearly complete understanding of them.
18.5 It is necessary to make concrete plans in order to improve in my clinical work.
18.6 I am very concerned about the impacts of cognitive biases (or irrational ways of thinking) on my clinical judgments.

19.1 As long as I continue seeing more clients, I will naturally improve over time.
19.2 I probably think I am more effective than I really am.
19.3 I really like reading about new research findings in several fields outside psychology and counselling.
19.4 I really like reading about new research in counselling/clinical psychology.
19.5 When I hear about new research contradicting my clinical practices, I force myself to look into it.
19.6 It is difficult for professional psychology/counselling to be scientific.
19.7 I regularly consult primary research sources to answer my questions about practice.

20.1 I value research.
20.2 I value science.
20.3 I should use counselling/clinical research to inform my work.
20.4 I approach my clinical work like a scientist by gathering data, and generating and testing hypotheses.
20.5 It is necessary to understand basic psychological principles in order to be good at my job.

20.6 Psychotherapy is more art than science.
20.7 The more I know about psychological science, the better I am at my job.
20.8 My clients are better off if I am a scientist-practitioner.

(Response option added: *N/A*)

21.1 The knowledge-focused EPPP (Examination for Professional Practice in Psychology) covers content important to practice.
21.2 Studying for the knowledge-focused EPPP (Examination for Professional Practice in Psychology) made me better at my job.
21.3 Undergraduate (or foundational) psychology courses have informed my work with clients.
21.4 Please select Disagree for this item.

[new page]

[PART 3 - Demographics & Training]

In this last major section of the survey, we would like to know more about you, the work you do, and your training background! Please answer as best as you can.

22. Please enter your age: _____

23. Gender Identity:
- Female
- Male
- Gender Diverse
- Transgender
- I prefer not to say
- Other (please specify) _____

24. In which province/territory do you primarily work? [list provinces/territories]

25. Official Professional Title – What are you called by your *primary* regulator/governing body/association, even if a voluntary certification?
- Psychologist (Registered, Licensed, Certified, etc.)
- Provisional Psychologist (Psychologist Candidate; Supervised Practice; Candidate Register; Resident in Psychology; Interim Member; Provisional Practice Member)
- Psychological Associate
- Psychological Associate Candidate (Supervised Practice; Interim Autonomous Practice)
- Registered Psychotherapist
- Canadian Certified Counsellor
- Counselling Therapist
- Other Registered or Certified Counsellor (Pastoral; Clinical Counsellor; Counselling Therapist; Career Counsellor; etc.)
- Other (please specify) _____

26. Which of the following titles **best** represents how you think of yourself or your identity? This can be different from your official professional title.
    - o Psychologist
    - o Counselling Psychologist
    - o Clinical Psychologist
    - o School Psychologist
    - o Provisional Psychologist
    - o Psychological Associate
    - o Counsellor
    - o Psychotherapist
    - o Therapist
    - o Mental Health Therapist
    - o Other (please specify) _____

27. How many years have you been in clinical/counselling practice? (Only count work as a registered/certified professional.) _____

28. In what settings do you work? (Check all that apply.)
    - Armed Forces
    - Child / Adolescent Psychiatric or Pediatric
    - Community Mental Health Center
    - Consortium
    - General Hospital
    - Medical School
    - Outpatient Clinic
    - Prison / Correctional Facility
    - Primary Care Network
    - Private Practice – Group
    - Private Practice - Solo
    - Psychiatric Unit / Hospital
    - School / School District
    - University / College Education / Educational Psychology Department
    - University / College Counselling Center
    - Other (please specify:) _____

29. What kinds of counselling/psychology-relevant work do you do? (Check all that apply.)
    - Clinical/Counselling Treatment
    - Formal Assessment (e.g., intelligence, personality, mental health, parenting, forensic, etc.)
    - University/College Instruction
    - Research
    - Managerial, Administrator, or Clinical Lead/Director
    - Clinical Supervision
    - Academic Supervision
    - Public Education / Advocacy

- Program Evaluation
- Professional Consultation
- Other (please specify:) _____

30. Please indicate all university programs **directly relevant to <u>psychotherapy/counselling</u>** or **<u>psychology</u>** that you have completed or are in the process of completing.

	Completed	**In Progress**
Master's Degree – Master of Arts (MA)	☐	☐
Master's Degree – Master of Education (MEd)	☐	☐
Master's Degree – Master of Science (MSc)	☐	☐
Master's Degree – Master of Counselling (i.e., *not* MA, MSc, or MEd)	☐	☐
Doctoral Degree – PhD	☐	☐
Doctoral Degree – PsyD	☐	☐
Doctoral Degree - EdD	☐	☐
Diploma (in counselling or related field)	☐	☐
Bachelor's Degree (BSc; with a **<u>major</u>** in psychology, counselling, or a directly related field)	☐	☐
Bachelor of Arts (BA; with a **<u>major</u>** in psychology, counselling, or a directly related field)	☐	☐

Other (please specify) _____

31. Please indicate what type of graduate training you received. In other words, what was your program of study called?

- Counselling
- Counselling Psychology
- Clinical Psychology
- School Psychology
- Marriage and Family Therapy
- Other (please specify) _____

32. To the best of your recollection, please indicate how much undergraduate and graduate training you have had in each of the following areas.

	No Training	**1-2** University-Level Courses	**3+** University-Level Courses
Research Methodology (e.g., intro to research methodology, quantitative/qualitative research methods, advanced research methods, etc.)	☐	☐	☐
Statistics	☐	☐	☐
Cognitive Psychology (e.g., cognition, learning, sensation, perception, motivation, emotion)	☐	☐	☐
Biological Psychology (e.g., psychopharmacology, neuropsychology, physiological psychology, health psychology)	☐	☐	☐
Individual Psychology (e.g., personality, development, abnormal psychology, individual differences)	☐	☐	☐
Social Psychology (e.g., psychology of groups, culture, ethnicity; systems/organization theory, gender)	☐	☐	☐
Psychometrics (e.g., measurement theory, survey/test design, scaling/scoring methods)	☐	☐	☐
Assessment (e.g., of intelligence, learning/achievement, personality)	☐	☐	☐
Other Science Courses (e.g., biology, chemistry, genetics, neuroscience)	☐	☐	☐

33. Outside of formal course-based training, how much self-directed (e.g., reading, podcasts, etc.) or seminar/workshop-based training have you done in the following areas?

	No self-study/seminars	Some reading, seminars, etc.	Extensive reading, seminars, etc.
Research Methodology	☐	☐	☐
Statistics	☐	☐	☐
Cognitive, Biological, Individual, and Social Psychology	☐	☐	☐
Psychometrics	☐	☐	☐
Assessment	☐	☐	☐
Other Science Topics (e.g., biology, chemistry, genetics, neuroscience, etc.)	☐	☐	☐

34. Please indicate your level of training in the following subject areas. (Check all that apply.)

	No training.	Mentioned during **university coursework**.	Some formal training in **university coursework**	One or more entire **university course.**	Dedicated **workshop(s) or seminar(s).**	**Reading/ self-study.**	**Supervision** obtained in this area.
Feedback Informed Treatment (i.e., Progress/ Outcome Monitoring)	☐	☐	☐	☐	☐	☐	☐
Formal Diagnosis	☐	☐	☐	☐	☐	☐	☐
Evidence-Based Treatment Interventions (e.g., Empirically Supported Treatments)	☐	☐	☐	☐	☐	☐	☐
Common Factors Model of Treatment	☐	☐	☐	☐	☐	☐	☐
Scientific Method (e.g., what it is, how to do it)	☐	☐	☐	☐	☐	☐	☐
Evidence-Based Clinical Decision-Making	☐	☐	☐	☐	☐	☐	☐
Research Literacy (e.g., how to find, read, evaluate, & implement research)	☐	☐	☐	☐	☐	☐	☐

[new page]
[PART 4 - Exit Questions]

Almost there! Just a few exit questions!

35. Did you find yourself looking up information during this questionnaire to help you answer questions?
- o Yes
- o No

36. Please rate your **experience** working in the following areas:

	No experience	A little experience	Moderate experience	Extensive experience
Depressive Disorders	☐	☐	☐	☐
Career Counselling	☐	☐	☐	☐
Trauma	☐	☐	☐	☐

37. Please rate your **training** in the following areas:

	No training	A little training	Moderate training	Extensive training
Depressive Disorders	☐	☐	☐	☐
Career Counselling	☐	☐	☐	☐
Trauma	☐	☐	☐	☐

[new page]
[PART 5 – Debrief, Data-Removal, & Follow-Up Interview Invitation]

Before you go:

You might have wondered what this survey was asking about. Within the realm of clinical decision- making, we are specifically researching science-informed practice, including attitudes and experiences.

38. Knowing this, please indicate if **you would like your anonymous data <u>REMOVED</u>.**
- o Yes, **<u>REMOVE MY RESPONSES</u>** from the study.
- o Keep my data.

Or, perhaps you have *more* to say on the topic!

39. Are you willing to participate in a follow-up phone interview regarding the topics in this survey?
- o Yes [If yes, exit page – Part 6]

- No [If no, exit page – Part 7]

[new page]
[PART 6 - Exit Page / Yes to interview]

Great news!

Thank you for your willingness to participate in the next important phase of this research.

Please enter your contact information** so that we may follow up about an interview!
Email Address _____

**Your survey data will be linked to your email address. However, it will be kept completely confidential and only the Principal Investigator will have this information. Please consult the consent and information form for more information. As always, you may contact the Principal Investigator with any questions or concerns: hgower@ualberta.ca.

[new page]
[PART 7 - Exit Page / No to interview]

Thank you so much for participating in this study! Your time and effort are sincerely appreciated. If you have any questions or comments about this research, please contact the principal investigator, Heather Gower, at hgower@ualberta.ca.

[new page]
[PART 8 - Exit Page / Did not meet inclusion criteria]

It looks like this survey isn't a good fit for you! If you think you reached this page in error, here is the start page of this survey.

If you have questions or concerns, please contact Heather Gower (hgower@ualberta.ca).

Otherwise, have a great day!

Appendix F: French Science-Informed Practice and Demographics Survey

[SURVEY START]

Bonjour!

Merci d'être ici. Ce sondage porte sur les approches de la prise de décision clinique en psychologie professionnelle au Canada (psychologie du counseling, psychologie clinique, counseling, etc.).

Dans la première section, le sondage présentera des scénarios hypothétiques de deux psychothérapeutes. Nous vous demanderons d'évaluer chaque prise de décision de chacun des thérapeutes. Dans les dernières sections du sondage, nous vous poserons des questions sur vos propres attitudes en lien avec le travail et sur votre histoire professionnelle. Nous souhaitons utiliser les résultats de ce sondage pour mieux comprendre notre profession, notamment en ce qui concerne les besoins en matière de formation et de politiques.

Ce sondage prendra environ 20-25 minutes.

Ce sondage est **anonyme** et vous pouvez quitter le sondage à tout instant.

Le plan de cette étude a été examiné par le comité d'éthique de la recherche de l'Université de l'Alberta (Pro00110343). Si vous avez des questions au sujet de vos droits ou pour savoir comment la recherche est menée, vous pouvez contacter le bureau du comité d'éthique par téléphone au (780) 492-2615.

Vous trouverez la lettre d'information et le formulaire de consentement ici: https://bit.ly/3gi6bxe

Si vous avez des questions, veuillez contacter Heather Gower (hgower@ualberta.ca).

Merci de votre attention!

Sincèrement,

Heather Gower, M.Ed.
Chercheure Principale
Candidate au doctorat en psychologie du counseling
Université de l'Alberta (Accréditée par la Société canadienne de la psychologie)
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Superviseure:
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Professeur Adjoint
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hudsonbr@ualberta.ca

* 1. J'accepte de participer à l'étude de recherche décrite ci-dessus.
    - Oui
    - Non

[new page]
[INCLUSION/EXCLUSION QUESTIONS]

Tout d'abord, assurons-nous que vous êtes un(e) bon(ne) candidat(e) pour ce Sondage!

* 2. Votre formation supérieure était-elle en counseling, psychologie du counseling, psychologie clinique, ou un proche équivalent?

    - Oui
    - Non

* 3. Êtes-vous actuellement un(e) psychologue, un(e) associé(e) en psychologie, un(e) psychothérapeute autorisé(e), un(e) thérapeute en counseling certifié(e), un(e) conseiller(e) d'orientation, ou tenez-vous un poste très similaire* ?
*Doctorant(e) en psychologie, psychologue en pratique supervisée, résident(e) en psychiatrie, membre intérimaire, un(e) thérapeute en counseling enregistré(e), et agrée(e) ou certifié(e) auprès d'un organisme professionnel.

    - Oui
    - Non

* 4. En tant que professionnel(le) agréé(e), licencié(e) ou certifié(e), avez-vous traité ou évalué des clients pour une durée d'au moins un an au total ?

    - Oui
    - Non

[*Required question]

[new page]
[PART I - Knowledge & Skills]

Commençons!

Dans cette section, vous lirez un scénario hypothétique à propos d'un thérapeute et son client. Après chaque brève description, vous répondrez à une question. Vous n'avez pas besoin de vous rappeler de l'information d'une question pour répondre aux questions subséquentes.

Ce sondage est anonyme et les réponses honnêtes sont appréciées. Veuillez sélectionner les réponses qui correspondent véritablement à votre point de vue pour nous aider à mieux comprendre notre profession.

Veuillez noter que le terme « thérapeute » est utilisé parfois en vue de capturer tous les types de travailleurs en santé mentale concernés (psychologues, conseillers/ères, etc.). De même, le terme « client » est utilisé mais peut être substitué par le terme “patient”

[new page]

[SCENARIO 1 – James & Jo]

James est un thérapeute en milieu de carrière qui travaille dans un cabinet privé très actif. Il a récemment commencé à voir Jo, une cliente de 24 ans qui souffre de symptômes de dépression. Au cours de leur première séance, Jo lui révèle qu'elle a eu une enfance difficile, marquée par des violences émotionnelles et physiques de la part de ses parents. James a récemment suivi un cours approfondi portant sur un traitement des traumatismes. Il veut essayer ce traitement avec Jo. Lorsqu'il explique la thérapie à Jo, elle en apprécie l'idée.

5. Dans quelle mesure évalueriez-vous chacun des éléments suivants comme des **justifications** possibles du choix de ce traitement par James ? Vous devez considérer chaque justification <u>indépendamment</u>.

(Response options: *Pas du tout justifiable, Un peu justifiable, Modérément justifiable, Très justifiable*)

5.1 Du moment que Jo et James ont une bonne relation, le traitement va probablement fonctionner.
5.2 Le traitement est utilisé par une majorité de thérapeutes.
5.3 Le cours suivi par James a fourni plusieurs vraies études de cas de clients se portant mieux après avoir reçu ce traitement.
5.4 Le traitement existe depuis plusieurs décennies.
5.5 Le traitement est approuvé par une importante association professionnelle de psychologie.
5.6 Le développeur du traitement est reconnu dans le domaine.
5.7 Puisque Jo aime l'idée du traitement et y consent, James peut aller de l'avant avec ce traitement.
5.8 Tous types de traitements sont aussi efficaces les uns que les autres.

[new page]

Lors de la troisième séance, Jo explique que parfois elle pense avoir oublié certains des pires moments d'abus de son enfance et que ces souvenirs reviennent lentement depuis le début de la thérapie. James explique à Jo que les souvenirs peuvent être considérés comme plus probablement vrais s'ils évoquent des émotions vives et des réponses physiologiques fortes.

6. Dans quelle mesure êtes-vous d'accord ou non avec l'explication de James?

(Response options: *Fortement en désaccord, Pas d'accord, D'accord, Fortement d'accord*)

[new page]

Lorsque James raconte à un collègue qu'il essaye un nouveau traitement, le collègue demande à James s'il a consulté certaines des données probantes ou des écrits qui critiquent le traitement, dans la mesure où ce collègue a entendu une certaine controverse autour de ce traitement.

7. Dans quelle mesure les réponses suivantes que James pourrait donner à son collègue sont-elles **vraies** ou **légitimes** ? Vous devez évaluer chaque réponse indépendamment.

(Response options: *Très faux/illégitime, Un peu faux/illégitime, Un peu vrai/légitime, Très vrai/légitime*)

7.1 Il cherche plutôt à prêter attention aux signes indiquant que le traitement fonctionne pour Jo, au lieu de chercher les données probantes qui vont à l'encontre du traitement.
7.2 Il a observé une certaine amélioration chez Jo, ce qui représente une preuve suffisante.
7.3 Les sources de recherche générale ne l'aideront pas à comprendre si le traitement fonctionne pour son client spécifique.
7.4 La recherche a peu d'utilité pratique.
7.5 La science est biaisée et rejette trop facilement ce qui ne fait pas partie du paradigme dominant.
7.6 Il n'a vu aucune preuve que le traitement est inefficace, en conséquence, il va continuer ce traitement.
7.7 La science est biaisée et rejette trop facilement ce qui ne fait pas partie du paradigme dominant.
7.8 Il n'a vu aucune preuve que le traitement est inefficace, en conséquence, il va continuer ce traitement.

[new page]

Un collègue demande à James s'il utilise des mesures objectives de suivi en continu avec Jo pour évaluer si son état s'améliore (p. ex., traitement informé par la rétroaction, des questionnaires réguliers pour évaluer sa progression et les résultats, etc.). James explique qu'il trouve difficile de trouver de bons outils, et donc il fait plutôt des suivis réguliers avec elle et l'interroge sur ses symptômes pour mesurer ses progrès.

8. De la liste ci-dessous, veuillez choisir toutes les façons dont James peut justifier ses choix concernant le suivi en continu. Veuillez cocher **toutes les réponses** qui s'appliquent ou cocher l'option *aucune de ces réponses* si aucune des options ne peut justifier le choix de James.

8.1 La plupart des clients sont en mesure de juger si la thérapie les aide, donc il peut simplement demander à Jo.
8.2 Si l'état de Jo s'améliore au cours de la thérapie, c'est probablement grâce à la thérapie.

8.3 Plusieurs études de cas démontrent l'efficacité de ce traitement, donc le suivi en continu à l'aide de mesures objectives n'est pas nécessaire.
8.4 James peut comprendre de manière holistique les progrès de Jo, donc il n'a pas besoin de recourir à des mesures objectives de suivi en continu.
8.5 La plupart des thérapeutes ont la capacité d'évaluer si l'état de leurs clients s'améliore.
8.6 Le suivi en continu prend trop du temps, ô combien précieux, de la séance de thérapie.
8.7 *Aucune des justifications* ci-dessus n'est juste.

[new page]

James trouve une citation d'un promoteur central du traitement, suggérant que ce traitement est largement applicable et très efficace. Ce promoteur indique qu'il existe des données probantes démontrant que le traitement fonctionne bien pour traiter le trauma, la dépression, l'anxiété, les obsessions, les phobies, les pulsions de dépendance, les compulsions, le deuil/la perte, les troubles alimentaires et toute une série d'autres problèmes.

9. De quelle façon cette information devrait-elle changer la confiance que James à en ce traitement ?

- Cela devrait le rendre **moins** confiant.
- Cela ne devrait pas affecter sa confiance.
- Cela devrait le rendre **plus** confiant.

[new page]

James est conscient que des modes de pensée baisés peuvent faire obstacle au travail clinique.

10. Veuillez évaluer dans quelle mesure les déclarations suivantes sont *biaisées ou potentiellement problématiques.*

(Response options: *Très problématique ou biaisée; Quelque peu problématique ou biaisée; Quelque peu raisonnable ou impartiale; Très raisonnable ou impartiale*)

10.1 James trouve une méta-analyse/revue systématique démontrant de bons résultats grâce à ce traitement.
10.2 James trouve un essai comparatif randomisé démontrant des changements significatifs dans le fonctionnement du client après avoir reçu le traitement.
10.3 James trouve un article expliquant que le traitement fonctionne en partie en réapprenant au corps et à l'esprit à travailler à une fréquence énergétique idéale, dans la mesure où les traumatismes peuvent perturber l'équilibre interne et affaiblir le système immunitaire.
10.4 Afin d'apaiser ses craintes quant à l'efficacité du traitement, James cherche et trouve plusieurs articles évalués par des pairs, publiés par le créateur du traitement et affirmant que celui-ci est efficace.

10.5 James trouve un article expliquant que cette thérapie fonctionne en partie en concentrant ses pensées sur des affirmations et des visualisations visant à provoquer des changements dans le monde physique.
10.6 Le collègue de James lui parle de plusieurs clients dont il se souvient qui ont beaucoup bénéficié de ce traitement.

[new page]

Continuons!
Cette section est comme la précédente, mais avec un nouveau thérapeute et un nouveau client. N'oubliez pas: vous n'avez pas besoin de vous rappeler des informations d'une question pour répondre aux questions suivantes.

[new page]
[SCENARIO 2 – Daniel & Alex]

Daniel est un thérapeute en milieu de carrière, qui vient de commencer à voir un nouveau client, nommé Alex. Alex a des inquiétudes concernant des symptômes dépressifs et a également de la difficulté avec son travail. Il s'agit de deux problèmes sur lesquels Daniel a travaillé avec succès dans le passé.

Daniel effectue une entrevue initiale et évalue également les symptômes dépressifs d'Alex à l'aide d'un questionnaire bien établi.

11. Comment Daniel devrait-il équilibrer les informations provenant du questionnaire et de l'entrevue ? Veuillez cocher toutes les réponses qui s'appliquent ou cocher l'option aucune de ces réponses si aucune des options n'est selon vous acceptable.
    11.1 L'intuition clinique doit être privilégiée par rapport aux résultats du questionnaire.
    11.2 S'il a utilisé une entrevue diagnostic structurée, Daniel devrait se soucier des divergences entre les résultats de l'entrevue et ceux du questionnaire
    11.3 Les cliniciens devraient se concentrer sur leur compréhension holistique des clients, et non sur les résultats des questionnaires.
    11.4 Daniel a beaucoup d'expérience avec les cas de dépression et peut se fier à ses jugements.
    11.5 Les jugements cliniques de Daniel peuvent être enrichis par l'utilisation de plusieurs questionnaires robustes.
    11.6 *Aucune* des options ci-dessus n'est acceptable.

[new page]

Après avoir examiné les résultats, le questionnaire suggère qu'Alex présente des symptômes très cohérents avec le trouble dépressif majeur (TDM). Cependant, au cours de l'entrevue, Daniel trouve que, malgré le fait qu'Alex réponde à la plupart des autres critères de diagnostic du TDM, il n'indique aucune perte d'intérêt ou de plaisir, aucun problème de sommeil ou d'appétit, et aucune idée suicidaire. Se fondant sur ces informations, Daniel n'est pas convaincu qu'Alex souffre du TDM.

12. Concernant le diagnostic, laquelle des déclarations suivantes Daniel devrait-il endosser? Veuillez cocher **toutes** les réponses qui s'appliquent ou cocher l'option *aucune de ces réponses* si aucune option n'est acceptable.
    - 12.1 Alex **ne répond pas** aux critères du TDM puisqu'il n'indique aucune perte de plaisir, aucun problème de sommeil ou d'appétit, et aucune d'idée suicidaire.
    - 12.2 Même si Alex répond aux critères du Trouble dépressif majeur, les diagnostics sont souvent inutiles.
    - 12.3 Les diagnostics peuvent être stigmatisant, il est donc préférable d'éviter l'étiquette du diagnostic.
    - 12.4 Le diagnostic fait seulement partie du modèle médical, il devrait être désaccentué.
    - 12.5 *Aucune* des déclarations ci-dessus.

[new page]

En explorant des stratégies d'adaptation pour ses symptômes dépressifs, Alex indique qu'il a trouvé que l'acupuncture l'avait aidé dans le passé. Alex demande à Daniel ce qu'il pense de recourir à l'acupuncture en parallèle à de la psychothérapie.

13. Lesquelles des réponses suivantes sont justifiables? Veuillez cocher toutes les réponses qui s'appliquent ou cocher l'option *aucune de ces réponses* si aucune réponse n'est justifiable.
    - 13.1 Il n'y a pas suffisamment de preuves pour statuer sur le fait de savoir si l'acupuncture aide ou pas contre la dépression, donc Daniel devrait éviter de porter un jugement.
    - 13.2 L'acupuncture pourrait aider en raison de l'effet "placebo" ou d'effets thérapeutiques plus généraux. Daniel pourrait donc fournir à Alex de la psychoéducation à ce sujet.
    - 13.3 L'acupuncture n'est pas une approche fondée sur la science et Daniel ne devrait donc pas la cautionner.
    - 13.4 Daniel devrait affirmer la perspective du client quant à ce qui fonctionne pour lui, et devrait ainsi soutenir l'utilisation de l'acupuncture pour Alex.
    - 13.5 Si Alex pense que l'acupuncture lui avait été bénéfique, alors Daniel peut soutenir un tel traitement.
    - 13.6 *Aucune* des réponses ci-dessus n'est justifiable.

[new page]

Alex explique que sa mère a également lutté contre la dépression et demande à Daniel si cela peut avoir un lien avec ses propres difficultés. Daniel indique que les antécédents familiaux d'Alex y jouent certainement un rôle et lui fait part de psychoéducation sur les schémas familiaux et l'héritabilité.

14. Lesquelles des raisons suivantes justifierait la réponse de Daniel à la question d'Alex? Veuillez cocher **toutes** les raisons qui s'appliquent ou cocher l'option *aucune de ces réponses* si aucune réponse peut justifier sa réponse.

14.1 Il est bien établi que la plupart des enfants adultes de parents déprimés présentent un attachement précaire.
14.2 La dépression est souvent le résultat d'un traumatisme.
14.3 Les troubles dépressifs ont généralement une composante génétique.
14.4 La plupart des problèmes psychologiques sont liés aux évènements de l'enfance.
14.5 La plupart des enfants de parents déprimés souffrent également de dépression.
14.6 *Aucune* de ces réponses n'est justifiable.

[new page]

Plus tard au cours du traitement, Alex souhaite se focaliser sur ses préoccupations relatives au travail. Il n'aime pas son travail et pense qu'il ne lui a jamais bien convenu. Daniel ainsi donne Alex le Myers-Briggs Type Indicator (MBTI) et le Strong Interest Inventory (SII) à compléter

15. De quelle façon Daniel peut-il justifier son approche à ce stade du traitement? Veuillez cocher **toutes** les réponses qui s'appliquent ou l'option *aucune de ces réponses* si aucune réponse peut justifier son approche.
15.1 Le MBTI a une bonne fiabilité et une bonne validité.
15.2 Le SII a une bonne fiabilité et une bonne validité.
15.3 Je ne suis pas sûr de la fiabilité et de la validité du MBTI et/ou du SII.
15.4 Même s'ils sont moins fiables, les outils d'évaluation peuvent être utiles tant qu'il existe un contexte pour interpréter les résultats de manière holistique.
15.5 Dans la mesure où ces instruments sont fiables, leur utilisation est mieux que de faire seulement de la thérapie par le dialogue.
15.6 *Aucune* de ces réponses ne justifie son approche.

[new page]

Après 20 séances, Alex rapporte avoir très peu de symptômes dépressifs et indique avoir de plus en plus recours à de nouvelles stratégies d'adaptation. Il a également été capable de fournir un plan pour explorer d'autres options professionnelles et se sent bien dans son travail avec Daniel.

16. Parmi la liste ci-dessous, veuillez choisir la meilleure ou la plus probable explication qui pourrait expliquer la progression d'Alex dans sa thérapie. Vous devriez considérer les déclarations suivantes comme vraies à propos d'Alex et de Daniel, sans prendre en compte les informations fournies jusqu'à présent dans ce scénario.
- Alex et Daniel ont établi une alliance thérapeutique très forte.
- Daniel a utilisé un traitement efficace pour les troubles dépressifs.
- Alex avait des attentes positives vis-à-vis de la thérapie et un niveau de détresse relativement faible au moment de l'admission.
- Daniel est empathique et chaleureux dans son approche envers ses clients.
- Je ne connais pas la recherche sur les processus et les résultats, donc je ne sais pas quelle est la meilleure réponse.
- Une grande partie de la recherche sur les processus/résultats présente des problèmes méthodologiques, donc il est impossible de répondre à cette question de manière

équitable.

[new page]

17. Laquelle des réponses suivantes devrait le plus convaincre Daniel que l'état d'Alex s'est amélioré de manière significative?
    - Alex dit à Daniel qu'il présente très peu de symptômes dépressifs et qu'il a des objectifs plus clairs concernant sa carrière.
    - Les mesures sur les résultats montrent que les niveaux de détresse d'Alex ont diminué et que son fonctionnement s'est amélioré au cours de la thérapie.
    - Daniel remarque qu'Alex semble plus heureux, moins sur ses gardes, et plus conscient de ses stratégies d'adaptation problématiques.
    - Au cours de la dernière séance, Alex exprime de manière positive tout ce qu'il a appris, décrivant clairement ses gains en termes de connaissances et de compétences.

[new page]

[PART 2 - Attitudes]

Super! Merci d'avoir répondu à ces questions. Le reste du sondage porte sur vous et votre pratique!

Cette brève série de questions concerne la manière dont vous menez votre travail avec **vos clients**.

Veuillez indiquer dans quelle mesure vous êtes en désaccord ou en accord avec les déclarations suivantes.

(Response options: *Fortement en désaccord, En désaccord, D'accord, Fortement d'accord*)

18.1 Afin d'améliorer ma pratique, il est nécessaire que je remettre en question mes actions et mes décisions.
18.2 Je reste sceptique quant à mes prises de décisions cliniques.
18.3 Je me trompe régulièrement sur certaines choses, même quand j'ai l'impression d'avoir raison.
18.4 Si je travaille avec un client suffisamment longtemps, je développerai une compréhension quasi complète de leur personne.
18.5 Il est nécessaire de faire des plans concrets afin de m'améliorer dans mon travail clinique.
18.6 Je suis très préoccupé par l'impact des biais cognitifs (ou modes de pensée irrationnels) sur mes jugements cliniques.

19.1 Tant que je continue à voir plus de clients, je vais m'améliorer naturellement avec le temps.
19.2 Je pense sans doute que je suis plus efficace que je ne le suis réellement.

19.3 J'aime beaucoup lire les résultats de nouvelles recherches dans plusieurs domaines autres que la psychologie et le counseling.
19.4 J'aime beaucoup lire sur les nouvelles recherches dans le counseling et la psychologie clinique.
19.5 Lorsque j'entends parler de nouvelles recherches qui contredisent mes pratiques cliniques, je m'efforce à les examiner.
19.6 Il est difficile pour la psychologie professionnelle/le counseling d'être scientifique.
19.7 Je consulte régulièrement des sources de recherches primaires pour répondre à mes questions sur la pratique clinique.

20.1 J'apprécie la recherche.
20.2 J'apprécie la science.
20.3 Je devrais utiliser la recherche sur le counseling/la psychologie clinique pour nourrir mon travail.
20.4 Je mène mon travail clinique comme un scientifique en rassemblant des données, en générant des hypothèses et en les testant.
20.5 Il est nécessaire de comprendre les principes psychologiques de base pour bien faire son travail.
20.6 La psychothérapie est plus un art qu'une science.
20.7 Le plus j'en sais sur les sciences de la psychologie, le mieux je suis dans mon travail.
20.8 Mes clients sont mieux servis si je suis un scientifique-praticien.

(Response option added: *N/A*)

21.1 L'**EPPP** (Examen pour la Pratique en Psychologie) axé sur les connaissances couvre un contenu important pour la pratique.
21.2 Étudier pour l'**EPPP** (Examen pour la Pratique Professionnelle en Psychologie) axé sur les connaissances m'a rendu meilleur(e) dans mon travail.
21.3 Les cours de psychologie du premier cycle (ou de base) ont permis d'améliorer mon travail avec mes clients.
21.4 Veuillez sélectionner En désaccord pour cet item.

[new page]

[PART 3 - Demographics & Training]

Dans cette dernière partie, nous aimerons en savoir plus sur vous, le travail que vous faites, et votre formation! Veuillez répondre aux questions suivantes du mieux que vous pouvez.

22. Veuillez indiquer votre âge: _____

23. Identité de genre:
- Femme
- Homme
- Genre divers
- Transgenre
- Je préfère ne pas répondre

- Autre (veuillez préciser) _____

24. Dans quelle province / territoires travaillez-vous principalement? [list provinces/territories]

25. Quel est votre titre selon votre ordre professionnel principal/conseil d'administration/association, même s'il s'agit d'une certification volontaire?
    - Psychologue (agréé(e), licencié(e), certifié(e), etc.)
    - Psychologue provisoire (candidat(e) à la psychologie; pratique supervisée ; registre des candidats ; résident(e) en psychologie ; membre intérimaire ; membre de pratique provisoire)
    - Psychologue associé(e)
    - Candidat(e) associé(e) en psychologie (pratique supervisée ; pratique autonome provisoire)
    - Psychothérapeute agréé(e) ou psychothérapeute autorisé(e)
    - Conseiller(e) canadien(ne) certifié(e)
    - Thérapeute en counseling certifié(e) ou thérapeute en counseling enregistré(e)
    - Autre conseiller(e) agréé(e) ou certifié (conseiller(e) pastoral, conseiller(e) clinique, conseiller(e) d'orientation, conseiller(e) de carrière, etc.)
    - Autre (veuillez préciser) _____

26. Lequel des titres suivants représente **le mieux** comment vous vous percevez ou à quoi vous vous identifiez? Ce titre peut être différent de votre titre professionnel officiel.

    - Psychologue
    - Psychologue de counseling
    - Psychologue clinicien(ne)
    - Psychologue scolaire
    - Psychologue provisoire
    - Psychologue associé(e)
    - Conseiller(e)
    - Psychothérapeute
    - Thérapeute
    - Thérapeute en santé mentale
    - Autre (veuillez préciser) _____

27. Depuis combien d'années pratiquez-vous la psychologie clinique/de counseling? (Ne veuillez compter que le travail en tant que professionnel(le) agréé(e)/certifié(e)). _____

28. Dans quel contexte travaillez-vous? (Veuillez cocher tous ceux qui s'appliquent).

    - Les forces armées
    - Psychiatrie ou pédiatrie enfant/adolescent
    - Centre communautaire de santé mentale
    - Le consortium
    - Hôpital général

- École de médecine
- Clinique externe
- Prison / établissement correctionnel
- Réseau de soins primaires
- Pratique privée pour la psychothérapie en groupe
- Pratique privée pour la psychothérapie individuelle
- Unité psychiatrique/hôpital
- École / Secteur scolaire
- Département de psychologie scolaire universitaire / collégiale
- Département de psychologie universitaire / collégiale
- Centre de counseling universitaire / collégial
- Autre (veuillez préciser) _____

29. Quels types de travaux liés au counseling ou à la psychologie effectuez-vous? (Veuillez cocher tous les items qui s'appliquent).

- Traitement clinique / counseling
- Évaluation formelle (p.ex. de l'intelligence, la personnalité, la santé mentale, la parentalité, la médecine légale, etc.)
- Enseignement universitaire / collégial
- Recherche
- Gestion, administration ou chef(e) / directeur (directrice) clinique
- Supervision clinique
- Supervision académique
- Éducation publique / plaidoyer
- Évaluation de programmes
- Consultation professionnelle
- Autre (veuillez préciser) _____

30. Veuillez indiquer tous les programmes universitaires **directement liés à la psychothérapie/counseling ou à la psychologie** que vous avez complétés ou êtes en train de compléter.

	Compléter	**En cours**
Maîtrise – Maîtrise en arts (MA)	☐	☐
Maîtrise – Maîtrise en éducation (MEd)	☐	☐
Maîtrise – Maîtrise en sciences (MSc)	☐	☐
Maîtrise – Maîtrise en counseling (soit pas une maîtrise en arts, en sciences, ou en éducation)	☐	☐
Doctorat – PhD	☐	☐
Doctorat – Doctorat en psychologie (DPsy)	☐	☐
Diplôme doctorat – Doctorat en éducation (DEd)	☐	☐
Diplôme (en counseling ou dans un domaine connexe)	☐	☐
Baccalauréat en sciences (BSc; avec une	☐	☐

spécialisation en psychologie, en counseling ou dans un domaine directement lié)		
Baccalauréat en arts (BA; avec une spécialisation en psychologie, en counseling ou dans un domaine directement lié)	☐	☐

Autre (veuillez préciser) _____

31. Veuillez indiquer quel type de formation supérieure vous avez reçue. Autrement dit, quel est le nom de votre programme d'études?

- o Counseling
- o Psychologie du counseling
- o Psychologie clinique
- o Psychologie scolaire
- o Thérapie conjugale et familiale
- o Autre (veuillez préciser) _____

32. Au meilleur de vos souvenirs, veuillez indiquer combien de formations du premier, deuxième et troisième cycle vous avez suivies dans chacun des domaines suivants.

	Aucune formation	**1-2 cours** de niveau universitaire	**3 cours ou plus** de niveau universitaire
Méthodologie de recherche (p. ex. intro à la méthodologie de recherche, méthode de recherche quantitative/qualitative, méthodes de recherche avancée, etc.)	☐	☐	☐
Statistique	☐	☐	☐
Psychologie cognitive (p. ex. cognition, apprentissage, sensation, perception, motivation, émotion)	☐	☐	☐
Psychologie biologique (p. ex. psychopharmacologie, neuropsychologie, psychologie, physiologique, psychologie de la santé)	☐	☐	☐
Psychologie individuelle (p. ex. personnalité, développement, psychologie anormale, les différences individuelles)	☐	☐	☐
Psychologie sociale (p. ex. psychologie des groupes, culture, ethnicité; théorie des systèmes/organisations, genre)	☐	☐	☐
Psychométrie (p. ex. théorie de la mesure, conception de sondage/tests, méthodes d'évaluation/de notation)	☐	☐	☐
Évaluation (p. ex. de l'intelligence, de l'apprentissage/la réussite, la personnalité)	☐	☐	☐

Autre cours de sciences (p. ex. biologie, chimie, génétique, neurosciences)	☐	☐	☐

33. En dehors de la formation formelle, combien de formations autodidactes (p. ex., par la lecture, les podcasts, etc.) ou basées sur des séminaires/ateliers avez-vous suivies dans les domaines suivants?

	Aucun auto-apprentissage/par séminaires	Quelques lectures, séminaires, etc.	Beaucoup de lectures approfondies, séminaires, etc.
Méthode de recherche	☐	☐	☐
Statistiques	☐	☐	☐
Psychologie cognitive, biologique, individuelle, et sociale	☐	☐	☐
Psychométrie	☐	☐	☐
Évaluation	☐	☐	☐
Autres sujets scientifiques (p. ex., biologie, chimie, génétiques, neurosciences, etc.)	☐	☐	☐

34. Veuillez indiquer votre niveau de formation dans les sujets suivantes. (Veuillez cocher tous ceux qui s'appliquent).

	Aucune formation	Mentionné dans le contexte de **cours universi-taires**	Une certaine formation formelle dans le contexte de **cours universi-taires**	Un ou plusieurs **cours universitaires complets**	**Des ateliers ou des séminaires spécialisés**	**Lecture/ Auto-apprentissage**	**Supervision** obtenue dans ce domaine
Traitement basé sur la rétroaction (p. ex., suivi en continu des progrès et des résultats)	☐	☐	☐	☐	☐	☐	☐
Diagnostic formel	☐	☐	☐	☐	☐	☐	☐
Interventions thérapeutiques fondées sur des données	☐	☐	☐	☐	☐	☐	☐

probantes (p. ex., traitements soutenus par des données empiriques)							
Modèle de traitement par les facteurs communs	☐	☐	☐	☐	☐	☐	☐
Méthode scientifique (p. ex., ce dont il s'agit, comment la mettre en pratique)	☐	☐	☐	☐	☐	☐	☐
Prise de décision clinique fondée sur des Données probantes	☐	☐	☐	☐	☐	☐	☐
Littératie de la recherche (p. ex., comment trouver, lire, évaluer et mettre en œuvre la recherche)	☐	☐	☐	☐	☐	☐	☐

[new page]

[PART 4 - Exit Questions]

Presque terminé(e) ! Il reste simplement quelques question

35. Avez-vous dû rechercher des informations au cours de ce sondage pour vous aider à répondre aux questions?
    - o Oui
    - o Non

36. Veuillez évaluer votre **expérience** de travail dans les domaines suivants

	Aucune expérience	Un peu d'expérience	Expérience modérée	Expérience approfondie
Troubles dépressifs	☐	☐	☐	☐
Orientation professionnelle	☐	☐	☐	☐

Trauma	☐	☐	☐	☐

37. Veuillez évaluer votre **formation** (p. ex. cours, séminaires, lectures, supervision, etc.) dans les domaines suivants.

	Aucune formation	Un peu de formation	Formation modérée	Formation approfondie
Troubles dépressifs	☐	☐	☐	☐
Orientation professionnelle	☐	☐	☐	☐
Trauma	☐	☐	☐	☐

[new page]

[PART 5 – Debrief, Data-Removal, & Follow-Up Interview Invitation]

Avant de partir…

Vous vous êtes peut-être demandé(e) sur quoi portait ce sondage. Dans le cadre de la prise de décision clinique, nous étudions spécifiquement la pratique fondée sur la science, y compris les comportements et les expériences des praticiens.

38. Sachant cela, veuillez indiquer si vous souhaitez que **vos réponses anonymes soient SUPPRIMÉES.**
   - o Oui, **SUPPRIMEZ MES RÉPONSES** de l'étude.
   - o Gardez mes réponses.

Ou, peut-être avez-vous plus à dire sur le sujet!

39. Seriez-vous d'accord pour participer à une entrevue téléphonique de suivi concernant les sujets abordés dans ce sondage? **Veuillez noter que cet entrevue se déroulera en anglais.**
   - o Oui [If yes, exit page – Part 6]
   - o Non

[new page]

[PART 6 - Exit Page / Yes to interview]

Great news!

Thank you for your willingness to participate in the next important phase of this research.

Please enter your contact information** so that we may follow up about an interview!
Email Address _____

**Your survey data will be linked to your email address. However, it will be kept completely confidential and only the Principal Investigator will have this information. Please consult the

consent and information form for more information. As always, you may contact the Principal Investigator with any questions or concerns: hgower@ualberta.ca.

[new page]

[PART 7 - Exit Page / Did not meet inclusion criteria]

Il semble que ce sondage ne corresponde pas à votre profil ! Si vous pensez être arrivé(e) à cette page par erreur, voici la page de départ de ce sondage.

Si vous avez des questions ou des préoccupations, veuillez contacter Heather Gower (hgower@ualberta.ca).

Sinon, nous vous souhaitons une très belle journée !

Appendix G: Information Letter and Consent Form (English & French)

INFORMATION LETTER and CONSENT FORM
Clinical Decision-Making in Canadian Professional Psychology: An Explanatory Sequential Mixed Methods Study

Principal Investigator:
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Supervisor:
Rebecca Hudson Breen, Ph.D.
Department of Educational Psychology
5-129 Education North
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Edmonton, AB. T6G 2G5
hudsonbr@ualberta.ca

This Information Letter and Consent Form discusses the **SURVEY DATA COLLECTION** portion of the study.

Invitation to Participate: You are being invited to participate in this study examining clinical decision-making among Canadian psychologists and counsellors. We have received your contact information either from the Canadian Psychological Association, Canadian Counselling and Psychotherapy Association, your licensing body, or another relevant organization.

Purpose: This survey explores clinical decision-making and attitudes among Canadian psychologists and counsellors. Results may inform training, practice, and policy.

Study Procedures: This mixed methods study has two parts: (a) an online survey and (b) follow-up interviews. **This information letter and consent form only applies to the survey.** If you agree to participate, you will answer questions about your background, training, and attitudes related to your work as well as questions about clinical decision-making based on brief vignettes. The survey data will be collected on the SurveyMonkey platform and will be anonymous. At the end of the survey, you may express your interest in participating in a follow-up interview.

Duration of Participation: The survey may take 20-25 minutes to complete.

Benefits: There is no payment or compensation for participating in this study. However, you may find it beneficial to reflect on clinical decision-making and your approach to practice. You will also be contributing to a clearer and more representative understanding of professional identity.

Risks: The main risk to participating in this research is that you may feel fatigue from completing the survey. Otherwise, there are no known risks to participating in this research.

Confidentiality & Anonymity: The information that you share will remain strictly confidential and will be used solely for the purposes of this research. Only the research team will have access

to the research data. The survey program (SurveyMonkey) used for data collection stores data on a server located in the continental USA and is subject to USA privacy legislation. Once survey data collection is complete, your responses will be deleted from the SurveyMonkey servers and stored on a password-protected and encrypted hard drive, which will be in a locked cabinet. Identifying information, should it be voluntarily disclosed, will only be seen by the Principal Investigator (Heather Gower) and will be subsequently anonymized. We may also seek to use the results of this study in future research. However, the Research Ethics Board of the University of Alberta will first approve any future use of your data.

Voluntary Participation: You are free to choose not to participate in this study, and you will experience no negative consequences whatsoever as a result. You are also free to discontinue your participation at any time, and you can modify your participation by skipping any questions you would prefer not to answer. If you choose to discontinue participation at a later point in time, you can request that your data be removed from the study and we will remove/destroy your data up until the data is aggregated, which is typically one to three months after your participation.

Information about Study Results: The data from this survey will be used in conjunction with follow up interview data for a Ph.D. dissertation as well as possible conference and journal publications. Only aggregated and anonymized data will be stored indefinitely and used in publications. At a future date (minimum of 5 years), should the data be deemed unnecessary for retention, the Principal Investigator will destroy the data so that any information cannot be read or reconstructed.

Ethics: The plan for this study has been reviewed by a Research Ethics Board at the University of Alberta (Pro00xxxxxx). If you have questions about your rights or how the research is being conducted, you can call (780) 492-2615. This office is independent of the researchers.

Further Information: If you have any further questions pertaining to your involvement in this study, feel free to contact the Principal Investigator, Heather Gower, using the contact information provided.

Thank you for your time!

Sincerely,

Heather Gower & Rebecca Hudson Breen

LETTRE D'INFORMATION et FORMULAIRE DE CONSENTEMENT
La prise de décision clinique en psychologie professionnelle au Canada : Une étude explicative séquentielle à méthodes mixtes

Chercheure principale :
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Superviseure :
Rebecca Hudson Breen, Ph.D.
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Cette lettre d'information et formulaire de consentement portent sur **LA COLLECTE DES DONNÉES DU SONDAGE**

Invitation à participer: Vous êtes invité(e) à participer à cette étude ayant pour objectif d'examiner la prise de décision parmi les psychologues et conseillers au Canada. Nous avons obtenu vos coordonnées soit par la Société canadienne de psychologie, par l'Association canadienne de counseling et de psychothérapie, par votre organisme de réglementation professionnel, ou par un autre organisme pertinent.

Objectif : Ce sondage explore la prise de décision clinique et les attitudes parmi les psychologues et conseillers au Canada. Les résultats informeront la formation, la pratique, et la réglement.

Procédures de l'étude : Cette étude de méthodes mixtes comprend deux parties : (a) un sondage en ligne et (b) des entrevues de suivi. **Cette lettre d'information et formulaire de consentement ne concernent que le sondage.** Si vous consentez a participer, vous devrez répondre à des questions portant sur votre formation, vos attitudes par rapport à votre travail, et à des questions sur la prise de décision clinique à partir de brefs scénarios cliniques. Les données du sondage seront collectées par la plateforme SurveyMonkey (le sondage sera anonyme). À la fin du sondage, vous aurez l'opportunité à participer à une entrevue a suivi.

Durée de la participation : Le sondage prendra environ 20-25 minutes à compléter.

Avantages : Il n'y a aucun paiement ou autre forme de compensation pour votre participation à ce sondage. Cependant, vous pourrez trouver bénéfique pour vous-même d'engager une réflexion sur la prise de décision clinique et votre propre approche envers la pratique clinique. Vous contribuerez aussi à une compréhension plus claire et plus représentative de l'identité professionnelle.

Risques : Le risque principal lié à votre participation dans cette recherche est que vous puissiez vous sentir fatigué(e) après avoir répondu à de telles questions complexes. Sinon, il n'y a aucun risque connu lié à votre participation dans cette recherche.

Confidentialité et anonymat : Les informations que vous partagerez demeureront strictement confidentielles et seront utilisées uniquement pour répondre aux objectifs de cette étude. Seule l'équipe de recherche aura accès aux données de la recherche. Le programme de sondage (SurveyMonkey) qui est utilisé pour la collecte des données de recherche stocke les données sur un serveur situé aux É.U. continentaux et est soumis à la législation américaine sur la confidentialité. Une fois la collecte des données de sondage complétée, vos réponses seront effacées des serveurs informatiques de SurveyMonkey et stockées sur un disque dur crypté et protégé par mot de passe, et qui sera placé dans une armoire verrouillée. Les données d'identification, si elles sont divulguées volontairement, ne seront vues que par la chercheure principale (Heather Gower) et seront ensuite anonymisées. Nous pourrions également chercher à utiliser les résultats de cette étude dans de futures recherches. Toutefois, le comité d'éthique de la recherche de l'Université de l'Alberta devra d'abord approuver toute utilisation future de vos données.

Participation volontaire : Vous êtes libre de choisir de ne pas participer à cette étude et vous n'en subirez aucune conséquence négative. Vous êtes également libre d'interrompre votre participation à tout moment, et vous pouvez moduler votre participation en sautant les questions auxquelles vous préférez ne pas répondre. Si vous décidez de cesser votre participation à un moment ultérieur, vous pourrez demander que vos données soient retirées de l'étude et nous supprimerons / détruirons vos données dès qu'elles auront été regroupées, ce qui se fait généralement un à trois mois après votre participation.

Information sur les résultats de l'étude : Les données de ce sondage seront utilisées conjointement avec les données de l'entrevue de suivi pour une thèse de doctorat, et, éventuellement, dans des présentations de conférences ou des publications de revues scientifiques. Seules les données regroupées et anonymisées seront conservées indéfiniment et signalées dans des publications. À une date ultérieure (au moins 5 ans), dans l'hypothèse où les données soient jugées inutiles à des fins de conservation, la chercheure principale détruira les données de façon qu'elles ne puissent pas être lues ou reconstituées.

Éthique : Le plan de cette étude a été examiné par le comité d'éthique de la recherche de l'Université de l'Alberta (Pro00110343). Si vous avez des questions au sujet de vos droits ou de la façon dont la recherche devrait être menée, vous pouvez appeler le 780-492-2615. Ce bureau est indépendant des chercheurs.

Informations supplémentaires : Si vous avez d'autres questions concernant votre participation à cette étude, n'hésitez pas à contacter la chercheure principale, Heather Gower, en utilisant les coordonnées fournies.

Nous vous remercions pour votre temps.

Sincèrement,

Heather Gower et Rebecca Hudson Breen

Appendix H: Subscale Map

			SKILLS		KNOWLEDGE					ATTITUDES	
			CRITICAL THINKING		SCIENTIFIC PRACTICE KNOWLEDGE			FOUNDATIONAL KNOWLEDGE		ATTITUDES	
					Mechanisms of						
ITEM	Type	Question content	Fallacious Reasoning	Pseudo-science Detection	Assessment & Actuarial Reasoning	Treatment, Pathology, Change	Science & Research Literacy	Cog Psych	Abnrml Psych	Growth Orientation	SIP
5.1	p	good relationship = trtmnt works	x			(x)					
5.2	p	argmnt from popularity	x								
5.3	p	argmnt from anecdote (case studies)	x								
5.4	p	argmnt from antiquity	x								
5.5	p	argmnt from authority	x								
5.6	p	argmnt from authority	x								
5.7	p	client likes it & consents (CF)	x			(x)					
5.8	p	all tx equally effective (CF)				x					
6	p	memory and emotion						x			
7.1	p	confirmation bias (confirmation not refutation)	x	x							
7.2	p	seen improvement - naïve realism	x	x							
7.3	p	research too general	x								
7.4	p	research not practical									x
7.5	p	science is biased / dom paradigm									x
7.6	p	no proof ineffective (burden of proof)	x	x							
8.1	d	clients can tell (naïve realism)		x	(x)						
8.2	d	CSET - improving bc of trtmnt	x								
8.3	d	case studies = PM unneccessary	x		(x)						
8.4	d	holistic understanding = PM unneccessary		x	(x)						
8.5	d	therapists good at telling (naïve realism)	x	x	(x)						
~~8.6~~	~~d~~	~~PM too much time~~									
~~8.7~~	~~d~~	~~none of the above~~									
9	p	absence of boundary conditions		x							
10.1	p	metaanalysis (evidence hierarchy)					x				
10.2	p	RCT (evidence hierarchy)					x				
10.3	p	energy healing - pseudoscience		x		(x)					
*10.4	p	conf bias (but peer-reviewed)		x							
10.5	p	manifest destiny - pseudoscience		x		(x)					
10.6	p	anecdote (case consult)	x								
11.1	d	intuition > questionnaire	x	x	(x)						
11.2	d	if struc diag int, concern re: discrepancy			x						
11.3	d	holism > questionnaire	x	x	(x)						
11.4	d	experience fallacy (naïve realism)	x	x	(x)						
11.5	d	clinical strengthened by questionnaires	x		(x)						
~~11.6~~	~~d~~	~~none of the above~~									
12.1	d	diagnostic criteria				x					
12.2	d	diagnoses unhelpful									x
12.3	d	diagnoses stigmatizing									x
12.4	d	diagnoses = medical model									x
~~12.5~~	~~d~~	~~none of the above~~									
*13.1	d	insufficient evidence re: acupunc & dep		(x)		x			x		
13.2	d	placebo psychoed				x			x		
13.3	d	acupunc not science-based				x					
13.4	d	acupunc client affirm	x			(x)					
13.5	d	if helpful then can support	x	x		(x)					
~~13.6~~	~~d~~	~~none of the above~~									
14.1	d	most children of dep = insecure attach		x		x			x		
14.2	d	dep bc trauma		x		x			x		
*14.3	d	dep genetic				x			x		
14.4	d	psychopathology prob bc childhood		x		x			x		
14.5	d	dep bc parents dep		x		x			x		
~~14.6~~	~~d~~	~~none of the above~~									
*15.1	d	MBTI good rel & val			x						
15.2	d	SII good rel & val			x						
*15.3	d	unsure re: rel/val SII/MBTI			x						
15.4	d	ok unrel bc holistic interp		x	(x)						
15.5	d	if reliable, better than just talk tx			x						
~~15.6~~	~~d~~	~~none of the above~~									
*16	d	most determinant of outcomes?				x					
17	d	most robust outcome measure?		x	x						
18.1-19.5	p	attitude/belief items								x	
19.6-21.3	p	attitude/belief items									x

Note. Type: d = dichotomous; p = polytomous. Struckout items were removed from analysis immediately (mostly as non-measurement items).
*items were removed because of counter-intuitive performance
(x) indicates secondary/minor overlap/contamination
highlighted x indicates item isolated to knowledge subscale

Appendix I: SIP Test Subscales, Items, Scoring, and Rationale

SIP Critical Thinking Skills, Knowledge, and Attitudes Question Key

Subscale: Critical Thinking Skills (CTS)

Q #	Item Content	SIP Answer	SIP Construct Component
5.1	As long as Jo and James have a good relationship, the treatment will probably work.	*Not at all justifiable*	Fallacious reasoning (common factors)
5.2	The treatment is used by a majority of therapists.	*Not at all justifiable*	Argument from popularity
5.3	The course James took provided multiple true case studies of clients improving after receiving the treatment.	*Not at all justifiable*	Argument from anecdote
5.4	The treatment has been around for many decades.	*Not at all justifiable*	Argument from antiquity
5.5	The treatment is endorsed by a major professional psychology association.	*Not at all justifiable*	Argument from authority
5.6	The developer of the treatment is a well-known name in the field.	*Not at all justifiable*	Argument from authority
5.7	Since Jo likes the sound of the treatment and consents, he can go ahead with it.	*Not at all justifiable*	Fallacious reasoning (common factors)
7.1	He is more interested in paying attention to signs that the treatment is working with Jo, rather than seeking out evidence against it.	*Very false/illegitimate*	Confirmation bias (confirmation not refutation; absence of self-correction)
7.2	He has seen Jo improving, and that is sufficient evidence.	*Very false/illegitimate*	Naïve realism
7.3	General research sources won't help him understand if the treatment works for his specific client.	*Very false/illegitimate*	Fallacious reasoning (special pleading)
7.6	He has seen no proof that the treatment is ineffective, so he will carry on.	*Very false/illegitimate*	Burden of proof reversal
8.1	Most clients can tell if therapy is helping them, so he can ask Jo.	[*Not endorsed*]	Naïve realism
8.2	If Jo is improving while in therapy, it is likely because of the therapy.	[*Not endorsed*]	Causes of spurious effectiveness
8.3	Multiple case studies show that this is an effective treatment, so objective progress monitoring isn't really necessary.	[*Not endorsed*]	Argument from anecdote (evidence hierarchy error)
8.4	James can holistically understand Jo's progress, so he doesn't need progress monitoring scales.	[*Not endorsed*]	Mantra of holism (holism illusion)
8.5	Most therapists are good at telling if their clients are improving.	[*Not endorsed*]	Naïve realism

9	How should this information change James' confidence in the treatment? [The treatment was claimed to help a *long* list of presenting concerns. See question vignette in Appendix E for full information.]	*It should make him **less** confident.*	Absence of boundary conditions
10.3	James finds an article explaining that the treatment works partly by retraining the body and mind to work at an ideal energetic frequency since trauma can throw off our internal balance and weaken the immune system.	*Very problematic or biased*	Obscurantist language; absence of connectivity
10.5	James finds an article explaining that this therapy works in part by concentrating one's thoughts on affirmations and visualizations to cause changes in the physical world.	*Very problematic or biased*	Absence of connectivity
10.6	James' colleague tells him about several memorable clients who were helped a lot by this treatment.	*Very problematic or biased*	Argument from anecdote; availability heuristic
11.1	Clinical intuition should be prioritized over questionnaire results.	[*Not endorsed*]	Intuitive reasoning
11.3	Clinicians should focus on their holistic understanding of clients, not on questionnaire results.	[*Not endorsed*]	Mantra of holism
11.4	Daniel has quite a bit of experience with depression and can trust his judgments.	[*Not endorsed*]	Experience fallacy & naïve realism
11.5	Daniel's clinical judgments can be strengthened further with the use of multiple robust questionnaires.	[*Endorsed*]	Actuarial preference
13.4	Daniel should affirm the client's perspective about what works for him, supporting Alex's use of acupuncture.	[*Not endorsed*]	Culture of affirmation over science
13.5	If Alex has found acupuncture helpful, then this is a treatment that Daniel can support.	[*Not endorsed*]	Fallacious reasoning (common factors / client affirming)
14.1	There is good evidence that most adult children of depressed parents show insecure attachment.	[*Not endorsed*]	Statistical errors; negativity bias; environmental fallacy
14.2	Depression is often a result of trauma.	[*Not endorsed*]	
14.4	Most psychological problems have something to do with childhood events.	[*Not endorsed*]	
14.5	Most children of parents with depression also have depression.	[*Not endorsed*]	
15.4	Even if they are less reliable, assessment tools can be useful as long as there is context to interpret results holistically.	[*Not endorsed*]	Mantra of holism

17	Outcome measurements show that Alex's distress levels have decreased and that his functioning has improved over the course of therapy.	[E*ndorsed*]	Naïve realism vs actuarial reasoning
	Subscale: SIP Attitude		
7.4	Research provides little practical use.	*Very false/illegitimate*	SIP attitude
7.5	Science is biased and too easily dismisses what isn't part of the dominant paradigm.	*Very false/illegitimate*	SIP attitude
12.2	Even if Alex meets the criteria for Major Depressive Disorder, diagnoses are often unhelpful.	[*Not endorsed*]	SIP attitude
12.3	Diagnoses can be stigmatizing, so it is better to avoid the label.	[*Not endorsed*]	SIP attitude
12.4	Diagnosis is part of the medical model and should be de-emphasized.	[*Not endorsed*]	SIP attitude
18.1	To improve, it is necessary that I question my actions and decisions.	*Strongly agree*	Humility
18.2	I remain skeptical of my clinical decision-making.	*Strongly agree*	Humility
18.3	I am regularly wrong about things, even when I feel like I'm right.	*Strongly agree*	Humility
18.4	If I work with a client for long enough, I will develop a nearly complete understanding of them.	*Strongly disagree*	Humility (naïve realism)
18.5	It is necessary to make concrete plans in order to improve in my clinical work.	*Strongly agree*	Growth / deliberate practice
18.6	I am very concerned about the impacts of cognitive biases (or irrational ways of thinking) on my clinical judgments.	*Strongly agree*	Humility
19.1	As long as I continue seeing more clients, I will naturally improve over time.	*Strongly disagree*	Experience fallacy (naïve realism)
19.2	I probably think I am more effective than I really am.	*Strongly agree*	Humility
19.3	I really like reading about new research findings in several fields <u>outside</u> psychology and counselling.	*Strongly agree*	Curiosity, SIP attitude
19.4	I really like reading about new research in counselling/clinical psychology.	*Strongly agree*	Curiosity, SIP attitude
19.5	When I hear about new research contradicting my clinical practices, I force myself to look into it.	*Strongly agree*	Humility, Openness
19.6	It is difficult for professional psychology/counselling to be scientific.	*Strongly disagree*	SIP attitude

19.7	I regularly consult primary research sources to answer my questions about practice.	*Strongly agree*	SIP attitude
20.1	I value research.	*Strongly agree*	SIP attitude
20.2	I value science.	*Strongly agree*	SIP attitude
20.3	I should use counselling/clinical research to inform my work.	*Strongly agree*	SIP attitude
20.4	I approach my clinical work like a scientist by gathering data, and generating and testing hypotheses.	*Strongly agree*	SIP attitude
20.5	It is necessary to understand basic psychological principles in order to be good at my job.	*Strongly agree*	SIP attitude
20.6	Psychotherapy is more art than science.	*Strongly disagree*	SIP attitude
20.7	The more I know about psychological science, the better I am at my job.	*Strongly agree*	SIP attitude
20.8	My clients are better off if I am a scientist-practitioner.	*Strongly agree*	SIP attitude

Appendix J: Subscale Reliability Analyses

I reviewed all SIP items in detail to ensure that my measurement intentions were met. Attitude-focused items were separated from critical thinking and knowledge questions, as I considered these measures separate in light of the research reviewed in Chapter 1. This initial separation meant that items 7.4, 7.5, 12.2, 12.3, and 12.4 were included in the attitude scale along with the fully intended attitude items (all 18, 19, 20, and 21 items).

Next, I scrutinized critical thinking skills and knowledge items. Critical thinking skills questions involved pseudoscience detection, logical fallacies, and other reasoning errors. Knowledge questions included scientific practice knowledge, foundational knowledge, and research literacy knowledge, as explored in Chapter 2 (Survey Content and Procedure). In reviewing critical thinking skills and knowledge items, I removed item 8.6 (which lamented progress monitoring taking too much time), determining that item 8.6 failed to capture critical thinking or knowledge. I thought all remaining items were sufficiently representative of some aspect of SIP.

To check if the subscales were functioning as expected, I analyzed the reliability (i.e., Cronbach's alpha) of each subscale using jamovi. First, I analyzed the critical thinking skills scale with all items I had originally designated as critical thinking questions (except item 8.6). Cronbach's alpha for those 33 items was $\alpha = .82$. The worst performing item was item 10.4 with an item-total correlation of $r = .04$. Removing item 10.4 increased reliability of the critical thinking skills scale to $\alpha = .84$. All remaining critical thinking skills subscale items had item-total correlations between $r = .15$ and $r = .61$. Item 10.4 asked participants to assess bias in the following statement: *In order to calm his fears about if the treatment works,* [the therapist] *searches for and finds several peer-reviewed articles by the creator of the treatment claiming*

good effectiveness. This item was meant to measure confirmation bias; however, I wondered if inclusion of *peer-reviewed articles* was perceived by participants as legitimizing. This item reduced the reliability of the critical thinking scale, so it was removed.

To check if the knowledge subscale functioned as expected, I analyzed the reliability of its items (see highlighted items in Appendix H). The initial Cronbach's alpha was a paltry $\alpha = .02$. Several items were negatively correlated with the knowledge subscale total score. I removed the worst performing of those items one by one.

Removing item 15.1 (with an item-total correlation of $r = -.31$) increased Cronbach's alpha to $\alpha = .18$. Item 15.1 was a dichotomous question asking if the MBTI has good reliability and validity. Just under 16% of respondents incorrectly indicated that it did, but apparently not in a way that related as expected to other questions.

Next, removing item 13.1 (with an item-total correlation of $r = -.10$) increased Cronbach's alpha to $\alpha = .25$. Item 13.1 asked if it was justifiable that *There is not enough evidence to say if acupuncture does or does not help with depression, so* [the therapist] *should refrain from judgment*. Just under 36% of respondents endorsed this item as justifiable. It is possible that an item that essentially abstains from judgment is acceptable to many science-informed people. This item may require niche knowledge about the pseudoscience of acupuncture. In a sense, this question is asking if someone is unsure of something, which is likely easy to endorse.

The next worst item, item 16, had an item-total correlation of $r = .03$. Removing item 16 increased Cronbach's alpha further for the knowledge subscale to $\alpha = .27$. Item 16 asked participants to choose the best explanation for a client's progress in therapy from a list of options. More about this item is presented in the Chapter 3 Explanatory Factors section. Few

people answered this question correctly. I expect participants found this item to be difficult due to a strong belief among therapists that the therapeutic alliance is the strongest explanatory factor for a client's progress and that this belief captures those both more and less informed by science.

Finally, removing item 5.8 (item-total correlation $r = .03$) improved reliability slightly ($\alpha = .28$). Item 5.8 asked participants to rate how justifiable it is to use a treatment based on the idea that *All treatments are equally effective*. Just under 7% of respondents thought this idea was very justifiable, 14.3% of participants thought this idea was moderately justifiable, and 18.4% of participants thought this idea was slightly justifiable, leaving 60.8% who thought this idea was not at all justifiable (the most science-informed answer). This item did not correlate well with SIP, suggesting a complex relationship between common factors supporters and scientific reasoning or knowledge.

Because of the poor reliability of the knowledge scale, an aggregated score was not calculated. Some knowledge-based questions are explored in the Results chapter out of interest. Knowledge about some areas of therapy could exist exclusive of others, meaning that being science-informed about one concept does not guarantee being science-informed about other concepts. This reasoning may explain the poor reliability of knowledge items when joined in a scale.

Finally, the attitude scale performed well as is and no items were removed outside the three items that could not be included because of sample size reduction (as explained in the Predictors section).

Appendix K: CFA Factor Loadings

CFA Factor Loadings

Factor	Item	Estimate	*SE*	Item	Estimate	*SE*
Critical Thinking Skills	5.1	0.1746	0.01626	9	0.1196	0.01626
	5.2	0.1361	0.01708	10.3	0.1464	0.01708
	5.3	0.1772	0.01665	10.5	0.1112	0.01665
	5.4	0.1440	0.01741	10.6	0.1245	0.01741
	5.5	0.0917	0.01748	11.1	0.0764	0.01748
	5.6	0.1511	0.01715	11.3	0.1271	0.01715
	5.7	0.2113	0.01716	11.4	0.1246	0.01716
	7.1	0.2075	0.01690	11.5	0.0725	0.01690
	7.2	0.2148	0.01510	13.4	0.1526	0.01510
	7.3	0.1425	0.01610	13.5	0.1607	0.01610
	7.6	0.1903	0.01602	14.1	0.1063	0.01602
	8.1	0.1710	0.02573	14.2	0.0771	0.02573
	8.2	0.0693	0.01388	14.4	0.1609	0.01388
	8.3	0.0270	0.00907	14.5	0.0403	0.00907
	8.4	0.0924	0.01673	15.4	0.1582	0.01673
	8.5	0.0965	0.01724	17	0.2266	0.01724
Knowledge	6	-0.3391	0.04985			
	10.1	-0.0441	0.01164			
	10.2	-0.0405	0.01440			
	11.2	-0.0546	0.02809			
	12.1	-0.0720	0.02499			
	13.2	-0.0387	0.02285			
	13.3	-0.0367	0.01132			
	14.3	0.0224	0.02867			
	15.2	-0.0359	0.02224			
	15.3	-0.0195	0.02883			
Attitude	7.4	0.2574	0.03135	19.3	0.0958	0.04269
	7.5	0.3768	0.04581	19.4	0.2451	0.03945
	12.2	0.0974	0.01860	19.5	0.1953	0.03230
	12.3	0.0803	0.01604	19.6	0.3345	0.04071
	12.4	0.1055	0.02318	19.7	0.3256	0.03987
	18.1	0.1238	0.03364	20.1	0.3771	0.02895
	18.2	0.1061	0.04246	20.2	0.4059	0.02807
	18.3	0.0871	0.03837	20.3	0.3304	0.02787
	18.4	0.0883	0.03626	20.4	0.3448	0.03916
	18.5	0.2340	0.03808	20.5	0.1625	0.02965
	18.6	0.1818	0.04319	20.6	0.3073	0.04084
	19.1	0.1313	0.03959	20.7	0.3974	0.03568
	19.2	0.1450	0.03586	20.8	0.5138	0.04234

Appendix L: EFA Factor Loadings

EFA Factor Loadings

	Factor							
Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
20.1	0.733							
20.2	0.629							
19.4	0.627							
20.3	0.602							
20.7	0.521							
19.5	0.465							
19.7	0.459							
20.4	0.346							
20.5	0.340							
10.2								
5.5		0.689						
5.6		0.682						
5.2		0.669						
5.4		0.574						
5.3		0.564						
5.7		0.397						
5.8		0.357						
5.1		0.341						
19.1								
7.6			0.730					
7.1			0.596					
7.2			0.556					
7.3			0.519					
6			0.398					
10.6								
17								
19.6				0.553				
12.2				0.412				
20.6				0.408				
7.5			0.338	0.381				
11.3				0.364				
11.1				0.362	0.352			

	Factor							
Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
20.8	0.346			0.350				
12.4				0.347				
13.5				0.313				
7.4				0.302				
13.3								
11.5								
18.4								
10.1								
12.3								
15.4								
8.5					0.475			
8.1					0.460			
19.3					0.353			
11.4					0.353			
8.3					0.337			0.334
8.4					0.332			
8.2								
11.2								
10.3						0.658		
10.5						0.630		
9						0.422		
13.4						0.348		
12.1								
18.3							0.613	
18.2							0.604	
18.6							0.489	
19.2							0.429	
18.1							0.331	
18.5								
14.5								0.603
14.1								0.470
14.2								0.341
15.2								-0.309
14.4								
15.3								
15.5								

	Factor							
Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
13.2								
14.3								

Note. Factor loadings greater than 0.3 are shown.