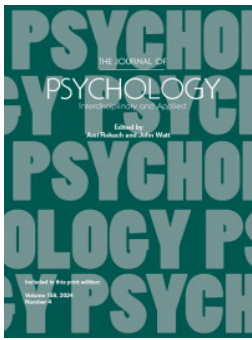


How do psychology professors view the relation between scientific knowledge and its applicability and societal relevance?

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How Do Psychology Professors View the Relation Between Scientific Knowledge and Its Applicability and Societal Relevance?

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ABSTRACT

How do researchers in psychology view the relation between scientific knowledge, its applicability, and its societal relevance? Most research on psychological science and its benefits to society is discussed from a bird's eye view (a meta-scientific perspective), by identifying general trends such as psychology's dominant focus on lab-based experiments and general descriptive theories. In recent years, several critics have argued that this focus has come at the cost of reduced practical and societal relevance. In this study, we interviewed Dutch psychology professors to gauge their views about the relation between psychological research and its relevance to society. We found that psychology professors engaged in a variety of activities to engage science with society, from work in clinical and applied settings, to consultancy, education, and science communication. However, we found that the role of theory when applying scientific knowledge to practical problems is far from straightforward. While most participants regarded theories as relevant to understanding general contexts of application, psychological theories were seldom directly related to specific applications. We compare and discuss our findings in the light of recent discussions about the lack of applicability and societal relevance of psychological science.

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Basic and applied research; societal relevance; applicability; science and society

Introduction

Over the past century, psychologists have come to play important roles in numerous practical and societal domains, such as in education, health and social services, the judicial system, advertising and marketing, technology and human factors, and more (Anastasi, 1964; Blatter, 2014; Goodwin, 2015; Proctor & Van Zandt, 2018; Wagenaar & Crombag, 2005; Zimbardo, 2004). Psychological testing and assessments, for example, have become widely used in clinical and counseling practices, admission procedures to educational facilities, and in personnel recruitment and job selection (Kaplan & Saccuzzo, 2017; Sternberg, 2000; Van Strien, 1966; Wood et al., 2002). Furthermore, psychological research on human perception, memory, and decision-making is highly relevant to the reliability of eye witness testimonies (Loftus, 1996; Munsterberg, 1908),

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risk assessment of industrial accidents (Wagenaar et al., 1990), and the design and optimization of technological equipment (Klatzky, 2009; Proctor & Van Zandt, 2018), to name just a few. Although psychologists have a rich history in terms of addressing practical and societal problems, the applicability and societal relevance of psychology have not been uncontested in past decades (Berkman & Wilson, 2021; Cialdini, 2009; Giner-Sorolla, 2019; Lilienfeld, 2012; Medin, 2012; Miller, 1969; Sherif, 1970; Silverman, 1971; Zimbardo, 2004). For example, Cialdini (2009, p. 6) stated that, “As we have moved increasingly into the laboratory and away from the study of behaviour, I believe we have been eroding the public’s perception of the relevance of our findings to their daily activities.” Similarly, Giner-Sorolla (2019, p. 1) has stated that, “Recent years have seen continued criticism of the discipline... for failing to value research in applied settings, for relying on limited populations and artificial measures, and for not effectively communicating a great deal of its findings to the public.” More recently, Berkman and Wilson (2021, p. 1) claimed that psychology suffers from a “practicality crisis” because “most psychological theories have little relevance to people’s everyday lives, poor accessibility to policymakers, or even applicability to the work of other academics who are better positioned to translate the theories to the practical realm.”

Clearly, the applicability and societal relevance of psychology have been recurring topics of discussion. In this article, we study how researchers in psychology view the relation between scientific knowledge, its applicability, and societal relevance. Previous discussions have usually focused on general trends in the field, with the aim of identifying overarching explanations for why psychology has been struggling with questions of applicability and societal relevance. Examples of such explanations are theoretical and methodological limitations of psychological research, and the obstacles and challenges in the accessibility and communication of psychological science to society (Berkman & Wilson, 2021; Giner-Sorolla, 2019; Klatzky, 2009; Lilienfeld, 2012; Medin, 2012; Miller, 1969; Silverman, 1971; Weiss & Weiss, 1981). Yet, what seems to be missing from this discussion is how such issues concern the individual researcher in one’s daily scientific practice. Are the general concerns highlighted in previous discussions also perceived and recognized by individual researchers?

In this study, we assess in what ways researchers from different disciplines within psychology consider their scientific knowledge (e.g., theories, methods, insights) to be relevant or applicable to societal problems, and what activities they engage in to connect science and society. Specifically, we gauge their views and experiences regarding the applicability and societal relevance of their scientific work and assess what obstacles and challenges researchers may perceive when connecting science to society. To study researchers’ views on these themes, we interviewed psychology professors at Utrecht University in the Netherlands. This topic is timely in the Netherlands, as the societal relevance of science has been prominently discussed in recent years. For example, the primary funding agency of scientific research in the Netherlands (e.g., NWO; Nederlandse Organisatie voor Wetenschappelijk Onderzoek) has made more funding available for research that aims to “benefit society and provide solutions for societal problems in the shorter term.” (NWO, 2022, p. 36). In a similar vein, the Nationale Wetenschapsagenda (i.e., National Science Agenda) came about as an initiative to combine the input of citizens and scientists to formulate a collective research agenda that addresses relevant scientific, social, and economic topics.

These developments in the Netherlands resemble what researchers in science, technology, and innovation (STI) studies have described as an increased emphasis on the production of both scientific *and* societal benefits from publicly-funded scientific research (Gibbons et al., 1994; Hessels et al., 2009; Leydesdorff & Etzkowitz, 1998). From this perspective, the ways in which science interacts with society is changing; knowledge production is not only evaluated in terms of scientific knowledge, but has become more context-driven, problem-oriented, and interdisciplinary, resulting in collaborations and interdependencies between academic institutions, the state, industry, and society at large. The current emphasis on societal benefits goes beyond scientific achievements and economic gains from research, but also aims to include a broader public value and usage to society (D'Este et al., 2018). Such changes in emphasis on both scientific and societal goals may have various implications for individual scientists, such as arising tensions between scientific interests and orientation, achievements, incentives, and rewards, as well as what constitutes relevant knowledge according to various institutions, funders, evaluators, and stakeholders (Benneworth & Olmos-Peñuela, 2018; D'Este et al., 2018; Degn et al., 2018).

In this study, the main focus will be on how individual researchers in psychology view the relationship between their scientific knowledge, its (potential) applicability, and societal relevance. We will examine how professors of psychology in the Netherlands engage in various public and societally relevant activities (aside from conducting research), and to what extent their scientific knowledge, theories, and methodologies influence these activities. We will also (but more briefly) examine how researchers view the changing trends in the relation of science to society mentioned above, and specifically to what extent the (recent) emphasis on societal relevance has influenced their scientific work. Before we introduce our interview study, we first outline the main concerns raised in the literature regarding psychology's lack of practical applicability and societal relevance.

A Crisis of Practical Applicability and Societal Relevance?

Is psychological science suffering from a crisis of practicality and societal relevance (cf. Berkman & Wilson, 2021; Giner-Sorolla, 2019), and if so, why? There certainly is no shortage of critics who have answered affirmatively, and neither is there a shortage of explanations. The main concerns cover psychology's focus on general theories and laboratory experiments, the limited validity and generalizability of psychological research, the accessibility and communication of findings in psychology's academic journals, researchers' perceptions of basic and applied research, and the incentives and rewards associated with different types of research. In addition to briefly summarizing these concerns, we also discuss models of the relation between different types of research (basic, applied) and how these are related to applicability and societal relevance.

General Theories and Laboratory Experiments

According to Berkman and Wilson (2021), psychology has been lacking in applicability because most researchers seem to be focused on general theories and laboratory

experiments, which do not readily translate to practical and societal problem-solving. As Berkman and Wilson (2021, p. 864) put it, “Theories are now evaluated mainly on their ability to account for decontextualized laboratory data and not their ability to help solve societal problems... many psychologists regard theory as an end in itself regardless of whether and how easily the theory addresses questions of practical significance.” In their view, a major problem is that researchers often do not specify the relevant boundary conditions, situational factors, and cultural contexts to which their conclusions are generalizable (see also Simons et al., 2017 for a discussion). As such, psychological research is often not directly usable by practitioners, policymakers, and stakeholders because its theories and insights are not contextualizable to applied problems and contexts. Berkman and Wilson (2021, p. 864) propose that researchers should work on building “practical theories,” which suggest “actionable steps toward solving a problem that currently exists in a particular context in the real world.” Berkman and Wilson (2021) provide a general research framework to develop practical theories, which includes starting from a research question that was inspired by a practical problem, collecting more observational and descriptive data, and by involving people from outside academia that have practical knowledge and experience with the particular problem and its context (i.e., community-engaged participatory research).

Validity, Representativeness, and Generalizability

A second concern is that research in psychology is typically conducted using convenience samples, e.g., psychology undergraduates. According to Giner-Sorolla (2019, p. 6), “research has overused samples of convenience, which can give a culturally, educationally, and demographically skewed picture of psychology” (but see Khemlani et al., 2010; Konečni, 2010). Giner-Sorolla (2019) argued that many studies are of limited generalizability because participants used in research are not representative of the target population one intends to draw conclusions about (see also Elms, 1975; Gallander Wintre et al., 2001; Henrich et al., 2010; Sears, 1986; Sherif, 1977). A related concern is that psychological research is typically conducted under systematically designed and controlled conditions in laboratory environments. Several researchers have argued that conclusions based on lab-based research may not generalize well to other tasks and situations (Kingstone et al., 2003; 2008; Shamay-Tsoory & Mendelsohn, 2019). Other critics have posited that developing practical applications and interventions based on lab-based research may be especially difficult, as the relevant conditions of the practical problem are not well accounted for in laboratory experiments (Berkman & Wilson, 2021; Cialdini, 2009; Giner-Sorolla, 2019; Helmreich, 1975; Silverman, 1971). As Silverman (1971, p. 583) put it, “If the multitude of social-psychological findings cannot aid the planners of society, it is apparently not because we have been researching the wrong topics. It must be that our data are not generalizable to the objects of our studies in their natural, ongoing states.” More recently, Giner-Sorolla (2019, p. 13) noted that, “not just our participants, but our stimuli and measures, might be non-representative... one arbitrary or artificial-seeming scenario comes into vogue to the exclusion of more realistic alternatives.” Giner-Sorolla (2019, p. 6) also posited that, “the worry

often arises that basic lab research cannot easily be reproduced under messier field conditions or is not amenable to crafting effective interventions.”

Other researchers have commented that criticisms about validity, representativeness and generalizability of lab-based research, e.g., labeling laboratory experiments and procedures as “artificial” or “lacking in ecological validity” (cf. Neisser, 1976; Shamay-Tsoory & Mendelsohn, 2019), are too general (Dunlosky et al., 2009; Holleman et al., 2020). Holleman et al. (2020), for example, have pointed out that the term ecological validity, a popular phrase in psychology to contrast lab-based research with “real life” research, often lacks the necessary level of specificity and tends to oversimplify discussions about a study’s representativeness and generalizability (see also Holleman et al., 2021).

Communication, Accessibility, and Appraisal

The lack of applicability and societal relevance in psychology has also been attributed to the accessibility and communication of scientific research to society. It has been posited that many journals in psychology are not suitable for effective communication of scientific knowledge to practitioners, stakeholders, and policymakers (Berkman & Wilson, 2021; Cialdini, 2009; Ellemers, 2013). In Berkman and Wilson’s (2021) study, research articles from a well-cited journal in social psychology were evaluated on several criteria of practicality, namely the level of specificity to practical problems, accessibility and writing style, and whether the articles contained practical implications or guidelines to deal with the problem of interest. Most notably, they found that most articles did not meet these criteria, although they are considered important for practitioners, stakeholders, and policymakers. However, Berkman and Wilson (2021) focused specifically on a single, prestigious social psychology journal. While their main conclusions may be applicable to similar journals, the list of journals in psychology that explicitly focus on applied topics is quite extensive¹, with journals dedicated to e.g., clinical, health and counseling psychology, neuropsychology, educational psychology, human factors, work and organizational psychology, and sport psychology. Moreover, some publishers now have dedicated outlets for applied topics. For example, the Journal of Experimental Psychology used to be dedicated to basic research on perception, attention, learning, memory, and decision-making. In 1995, the Journal of Experimental Psychology: Applied was added to specifically publish research in experimental psychology that “bridges practical problems with psychological theory.” As such, Berkman & Wilson’s focus on journals in (social) psychology with high-impact factors may be somewhat limited. However, their study does point to another issue often raised by critics, namely that there seems to be a perception among psychologists that applied research is valued less in the scientific community (see also Giner-Sorolla, 2019; Medin, 2012). Giner-Sorolla (2019) has further argued that academic journals in psychology are mainly focused on “a fresh theoretical idea” (p. 18) and especially value original studies and experiments with a kind of “cuteness and cleverness” (see also Ellemers, 2013; Meehl, 1967, p. 114). One could also wonder whether applications of basic psychological research should be expected in psychology journals. Perhaps practical applications of psychological science primarily occur in other disciplines and outlets dedicated to a particular applied topic, such as in education, law, economics, and industrial design.

In sum, the main concerns that may explain the lack of practical applicability and societal relevance of psychology center around psychology's focus on general theories and laboratory experiments, the assumed limited validity, representativeness, and generalizability of basic psychological research, the ways in which scientific knowledge is communicated and disseminated, and how particular perceptions, incentives and rewards in academic psychology may determine how different types of research are appraised.

On the Relation Between Scientific Knowledge and Practical Applicability

The ways in which scientific knowledge may be useful for practice has typically been described by scholars as following one of two models. In the “theory to practice”-model, it is posited that basic research produces knowledge and methods from which a range of applications can (potentially) be derived (Klatzky, 2009; Medin, 2012; Roll-Hansen, 2017; Stokes, 2011). According to this model, basic research is geared toward the development of general theories, undertaken as experimental or theoretical work, to acquire knowledge about the phenomena of interest without practical applications in mind. In contrast, applied research is typically aimed at addressing a specific problem or achieving a specific goal (Niiniluoto, 1993; Proctor & Van Zandt, 2018; Van Strien, 1997). As Medin (2012) put it, “People in applied settings have to do something, but the standard of evidence-based practice and knowing why something works has to wait for the underpinnings provided by basic research.” According to the “bidirectional”-model, insights from practical and applied settings and problems interact with, and feed back into, the domain of basic research, informing both theoretical and experimental work (see Medin, 2012; Figure 3). In this model, the relationship between scientific knowledge and practical knowledge is characterized as a continuous interaction, informed by both basic research and insights from practice.

It has been argued by some scholars that basic and applied research differ in terms of their purpose, theoretical scope, methodology, and criteria of success (Niiniluoto, 1993; Van Strien, 1997), whereas others have suggested that this “dangerous dichotomy” between basic and applied research may create unnecessary boundaries and even certain stereotypes about the purpose and potential applicability of different types of research (Medin, 2012, p. 1). Medin (2012), for example, argued that scientific knowledge in psychology may transfer from basic to applied research and vice versa via a third “bridging type” that lies at the interface between basic and applied work (Medin, 2012, Figure 2). He further points out, “Of course, there are numerous steps between the initial basic research and the eventual practical applications. These steps often involve messy details and many decisions about factors that probably don't matter, but maybe they do.” As science, technology, and innovation (STI) researchers have often argued, the notions of “basic research” and “applied research” are vastly oversimplified and do not adequately describe the chain of development of knowledge production and transformation. From this literature, it is posited that there is a need for more specific distinctions, such as “experimental development,” “curiosity-driven research,” and “strategic research” (Benneworth & Olmos-Peñuela, 2018; Stokes, 2011).

Within psychology, Klatzky (2009) has argued that psychological research and its applicability can be characterized by its level of maturity (e.g., whether applications are already used in practice, or whether they are still under development), its enabling fields of application (e.g., what disciplines are involved in its development), and its consuming fields of application, that is, where it is used and by whom, for example, in education, public policy, communication, etc. Most applications from experimental psychology, such as educational training programs, semantic text analysis systems, speech technologies and visual displays, are the result of interdisciplinary efforts, borrowing from and influencing other academic fields such as engineering, computer science, education, and linguistics (Klatzky, 2009, Table 1). Likewise, science, technology, and innovation (STI) researchers have characterized this complex and interdisciplinary process of scientific knowledge creation and its transformation into “usable knowledge” or “relevant knowledge” in terms of a “community” of heterogeneous actors who cultivate and circulate knowledge according to their own interests, needs, and reasons. This community can be divided into “knowledge creators” (scientists) and the “knowledge transformers,” those who create societal use out of scientific knowledge (Benneworth & Olmos-Peñuela, 2018; Stokes, 2011). For psychology, Klatzky (2009) has commented that: “few applications are so clearly founded in fundamental psychological science that their disciplinary roots are clear. Others may owe a debt to our science that is undocumented or unacknowledged.” (p. 524).

Present study

In sum, researchers have criticized different aspects of how scientific output in psychology is produced, communicated, and rewarded, and have made assertions about how these aspects have hampered psychology’s practical relevance to benefit society. These views approach the link between scientific knowledge in psychology, its societal relevance, and its applicability from a bird’s eye view on psychology (a meta-scientific perspective). However, this approach has given less insights into what individual researchers think and do about connecting science with society. The question beckons to what extent the issues outlined above are a matter of concern to researchers in their daily scientific practice? Are these concerns perceived and recognized by researchers, and does it affect how they conduct their work? In this study, we specifically focus on the individual perspectives and experiences of researchers in psychology about the relation between scientific knowledge and the (potential) applicability of their work. To this end, we conducted interviews with thirteen psychology professors structured around the following four research questions:

1. What roles and activities do psychology professors engage in to connect their scientific knowledge with practical and societal domains?
2. How do psychology professors view the relation between scientific knowledge and its (potential) applications, and what aspects of scientific knowledge do they consider to be applicable to the practical realm?
3. What challenges and obstacles do professors of psychology experience in the communication, translation, and application of psychology to the practical and societal realm?

Table 1. Overview of Participants Per Department, Research Interests, and Their Public Roles and Activities in Society.

Department	Research interests	Public roles and activities
Experimental psychology	Psychopharmacology, human factors, impulse control	Consultant, science communicator Interviews, public lectures, consultancy for government agencies
Experimental psychology	Attention, visual perception, working memory	Science communicator Writing books for general public, columns, other media appearances, public lectures
Experimental psychology	Translational neuroscience, clinical neuropsychology	Scientist-practitioner, science communicator, educator Clinical practice, writing books for general public, other media appearances, developing clinical guidelines, involvement in patient associations
Developmental psychology	Youth and adolescence, psychosocial development, family dynamics	Consultant, science communicator Interviews and columns, involvement in local and municipal research projects (academic workplace)
Developmental psychology	Psychosocial development, pedagogical diagnostics, and assessment	Scientist-practitioner, educator, consultant Clinical practice, Developing clinical guidelines and follow-up protocols, standardization of psychological tests
Developmental psychology	Self-perception and identity, behavioral change in children and adolescents	Science communicator Writing books for general public, interviews and columns, other media appearances, coordination of national research projects
Social, Health and Organizational Psychology	Psychophysiology of group processes	Science communicator Public lectures, interviews, columns
Social, Health and Organizational Psychology	Supervision, ethical behavior in organizations, leadership	Scientist-practitioner, consultant, educator, science communicator Consultancy for companies, expert interviews, field research in companies, media appearances
Social, Health and Organizational Psychology	Fairness, radicalization, social conflict	Science communicator, consultant Writing books for general public, public lectures, consultant for government agencies
Social, Health and Organizational Psychology	Social identity, diversity and inclusion, stereotypes and prejudice	Consultant, science communicator, educator Consultancy for companies, field research in companies, media appearances (interviews, writing columns)
Clinical psychology	Experimental psychopathology, anxiety disorders, behavioral therapy	Scientist-practitioner, consultant Clinical practice, consultant for government agencies (e.g., police, judicial advice), developing clinical guidelines
Clinical psychology	Trauma, bereavement, coping, therapy	Consultant, educator Developing clinical guidelines, involvement in practical associations, workshops, consultancy
Clinical psychology	Chronic pain and fatigue disorders	Science communicator, consultant, educator Developing clinical guidelines, involvement in patient associations, writing columns and booklets for patient associations, podcasts and webcasts for patients

4. How do psychology professors view changing trends in the emphasis in and demand for practical applicability and societal relevance of scientific knowledge?

We invited psychology professors from Utrecht University's four psychology departments, namely: (1) experimental psychology, (2) developmental psychology, (3) clinical psychology, and (4) social, health, and organizational psychology, which we considered a representative sample of psychology as an academic discipline. The reason to focus on professors, and not graduate students or postdoctoral researchers, is that we assumed that professors would have more experience in conducting research and engaging in

activities directed at the communication, translation, and application of their scientific expertise outside of academia. Also, professors are likely to have more experience in applying for grants, for which the emphasis on societal relevance of the research may be particularly important (see discussion about funding agencies in the Netherlands above).

We also wondered whether researchers' views on the relation between psychology and its applicability and social relevance would be related to their particular domain of expertise within psychology. A clinical psychologist, for example, who also treats patients aside from conducting research, may have a different perspective on the role of theory, methodology, and its relation to practice than, say, an experimental psychologist who studies the interplay between attention and memory, or a social psychologist who studies the relation between social attitudes and group dynamics. We further expected that different types of psychologists may occupy different roles in practical, applied, and public settings, aside from doing research. In sum, the goal of this study is to compare and contrast the views of Dutch psychology professors to what has been written about the ways in which researchers in psychology engage with practical and societal domains, and how they view the relation between scientific knowledge and its applicability and societal relevance.

Note that, throughout this study, we will use terms such as: theory, application, basic research, applied research, context of application, practical and applied settings, relatively loosely. One reason for this is that in the literature there are different interpretations and connotations of these terms. We provide specifications whenever possible. Nevertheless, given the flexible usage of these terms in literature and among our participants, we did not limit ourselves to too strict definitions.

Materials and Methods

Participants

We recruited thirteen participants by personal invitation (see [Table 1](#) for descriptions of their expertise). All participants provided informed consent using a digital informed consent form in *Qualtrics* to the recording of the interview and the use of the material for this study. The study was approved by the Ethics Committee of the Faculty of Social and Behavioral Sciences of Utrecht University (filed under protocol number 21-0475). Note that we did not interview any professors of psychology with a focus on psychometrics, methodology, or statistics, even though they represent an important part of the discipline, and notably have a long history of applied research in educational testing and psychological assessments (Borsboom & Wijsen, 2017; Kaplan & Saccuzzo, 2017; Sternberg, 2000). One reason for this is that there already have been studies that focus specifically on psychometrics. Although these studies were not all specifically aimed at practical applicability and societal relevance, some of these articles do discuss these topics (Borsboom & Wijsen, 2017; Groenen & Andries van der Ark, 2006; Wijsen et al., 2022).

Data Collection and Annotation

The interviews were conducted by author GH. All interviews except for one were conducted online *via* Microsoft Teams and recorded with the Microsoft Teams recording function. Simultaneously, *Audacity 2.1.3* was used to create an audio

recording as a backup. Each interview lasted approximately 45–60 min. In one interview, Microsoft Teams did not function well, and the interview was therefore continued via telephone.

The interviews began by asking participants to outline their scientific expertise and research interests. The rest of the interview was centered around the four main research questions outlined above. The interview was semi-structured, meaning that we constructed several specific questions (Appendix A), which served as a general guideline. In most interviews, however, there were interviewee-specific topics that came up aside from, or related to, the main questions. Prior to the interview, we communicated to the participants the general goal of the study. The specific questions for the interview were, however, *not* sent prior to the interview. After the data collection was finished, all interviews were transcribed verbatim and pseudonymized. The transcriptions were done in Dutch. Quotations given below were translated into English and slightly edited for brevity and readability by author GH.

Data annotation was done after transcription using a breadth-first annotation, followed by more fine-grained second annotation and analysis. First, author GH annotated relevant parts in the interview that followed the questions belonging to each of the four themes. We followed the Interview Template (Appendix A), as this template is organized around the four themes, allowing us to trace the relevant parts of the interview. These annotations would then be discussed with the other authors to decide upon its final categorization or label. In the end, we counted how many participants gave at least one example of one of the categories/labels that we defined beforehand, and those are reported in the results. No statistical analyses were conducted. Note that we also explain the more specific annotation approaches we used for the separate themes where applicable.

Results

Theme 1: What Roles and Activities Do Researchers Engage in to Connect Their Scientific Knowledge with Practical and Societal Domains?

Table 1 provides an overview of our participants' main research interests and their public roles and activities. Participants conducted research on a wide variety of subjects and all participants engaged in various public roles and activities. We identified at least four roles: (1) the scientist-practitioner, (2) the science communicator, (3) the consultant, and (4) the educator, which were also explicitly mentioned by the interviewees. We will briefly discuss every role and give some examples of how our participants engaged in these roles and activities. Note that most participants have multiple roles.

The Scientist-Practitioner

Four out of thirteen participants identified themselves as a scientist-practitioner. We consider a scientist-practitioner to be a psychologist who combines research with working in a practical setting, for example, as a therapist or counselor. In our sample of participants, one participant had worked as a clinical psychologist and a therapist

while also conducting experimental research. Another participant works as a clinical neuropsychologist in a hospital, conducting neuropsychological assessments with patients. This participant explained this role as follows:

My work has two sides. On the one hand the clinical work with patients who suffer from neurological disorders. I must find out what's going on and what could be done about it. Simultaneously I wonder how does it work, because if we find out perhaps we can better help the next patient.

One participant started out as a clinical and developmental psychologist in the 1980s, while simultaneously conducting research on the side for many years. Nowadays, this professor coordinates various postgraduate training programs for clinical and developmental psychologists. As this participant explained: "We train students to become scientist-practitioners. You need to advertise yourself as such and realize that one is not better than the other, the combination is essential to good practice and good science." Interestingly, apart from the clinical (neuro) and developmental psychologist mentioned above, one professor of social and organizational psychology also identified as a scientist-practitioner. This professor works as a supervisor in companies and described this role as follows:

I work as a supervisory officer for half of my time, the practical part. For the other half, I am a scientist [...]. I am always trying to establish more connection between both worlds. For example, how scientific findings or insights relate to the questions that arise from the practical domain.

As the above examples illustrate, the scientist-practitioner operates at the interplay between scientific psychology and its (applied) practice. The main idea is that scientist-practitioners are ideally suited to integrate and connect scientific insights into practice, e.g., by making use of scientifically validated methods, techniques and protocols when giving psychological assessments, and by contributing to practice-based research and the development of effective psychological services. Simultaneously, scientist-practitioners also aim to contribute to scientific research by incorporating insights from practice to advance and refine the research paradigms of the field (Baker & Benjamin, 2000; Jones & Mehr, 2007).

The Consultant

Nine out of thirteen participants gave examples of engaging in consultancy work, that is, giving expert advice from a scientific perspective to a societal party (e.g., governmental agencies, organizations, companies). One participant explained that, together with several other researchers, they had provided an expert report to the Directorate General for Public Works and Water Management in the Netherlands about how a new system to designate speed limit on Dutch highways could influence the expectations, comprehension, and compliance of traffic users. One professor of clinical psychology had over the past decades regularly consulted for the police and a national expertise center on crime. This participant explained that this job consisted of giving advice to a prosecutor or a judge about the kind of sentence or follow-up policy that would be most appropriate in a particular criminal case.

This advice was based on an interdisciplinary panel of psychologists, police officers and detectives who studied the case in depth. Other examples of consultancy work given by participants were writing advisory and evaluation reports of diversity and inclusion policies in schools and companies, giving advice to governmental agencies about radicalization and terrorism, and consulting for various clinical, medical, and patient organizations.

Note that we specifically distinguished the consultant from the scientist-practitioner because the examples given by participants showed that they were qualitatively different: the scientist-practitioners work in an applied or practical setting as an integral part of their job (whether in clinical practice or in industry), while the consultants clearly differed in the frequency and type of their consultancy work. The examples of consultancy work mentioned by participants were typically more on-demand, case-specific, and not necessarily limited to one practical setting or organization.

The Science Communicator

Nine out of thirteen professors gave examples of engaging in science communication, that is, informing, educating, and raising awareness of science-related topics by giving public lectures or interviews, writing for newspapers and magazines, or appearing on radio-and-TV programs to provide a scientific perspective on a current event in society. One professor of clinical psychology was involved in a podcast dedicated to patients who suffer from chronic pain and fatigue. Several professors also write books for a general audience. One professor of cognitive psychology had written several books in which insights about attention, visual perception, and memory were explained in lay terms. This participant stated: “I like to write those books, and I think it is very important for our discipline that there are experts that explain our scientific research.” One professor of developmental psychology had just finished a psychology book especially for children: “The idea of this book was to explain psychology to school-aged children, topics in psychology we also teach to our students [...]. I tried to make a selection of topics that would appeal to children.” One professor of clinical neuropsychology had written a book together with several fellow neuropsychologists about their daily experiences and stories of patients with neurological disorders.

The Educator

Six out of thirteen participants also engaged in teaching and educational activities for practitioners and professionals, thus outside of their regular teaching duties at the university. Two professors worked for national educational authorities that certify and license clinical psychologists and neuropsychologists. Furthermore, two professors of social psychology regularly give workshops about ethical leadership and diversity and inclusion in companies and organizations, and one professor of clinical psychology gives workshops to employees at funeral homes about the psychological insights related to grief and bereavement and how people cope with loss and trauma.

Although the four roles described above captured most of the public roles and activities of participants, a few roles and activities that some professors engaged in were not exactly captured by these four roles. For example, two professors were lead coordinators of research projects dedicated to increase collaborations between scientists and societal parties, and one participant was part of a research team of the local municipality in Utrecht dedicated to the wellbeing of youth in the city. Arguably, these roles fall somewhat inside activities of a research professor, but with a focus on the coordination and organization of research on a national level, instead of internal to their university.

Interim Conclusion #1. We found that most participants engaged in various roles and activities aimed at connecting scientific knowledge with the practical or societal domain. As such, this seems to contrast with some of the concerns discussed in the introduction, namely that psychological scientists have particular difficulties in applying and communicating their scientific knowledge and expertise to society (i.e., a “crisis of practicality”). In fact, our sample of professors of psychology seem to be in high demand for their roles and activities as science communicators, consultants, scientist-practitioners, and educators. Given this discrepancy, we were specifically interested in how researchers themselves view the relation between their scientific knowledge (e.g., research, theories, methodology) and its practical applicability and societal relevance.

Theme 2: How do Researchers View the Relation between Scientific Knowledge and Its (Potential) Applicability, and What Aspects of Scientific Knowledge Are Applicable to the Practical Realm?

As outlined in the introduction, some critics have lamented that most research in psychology is focused on general theories and laboratory experiments, instead of focusing on the production of scientific knowledge that can be utilized by practitioners, stakeholders, and policymakers to benefit society (cf. Berkman & Wilson, 2021; Giner-Sorolla, 2019). But what makes scientific knowledge in psychology useful or practical according to researchers themselves? And what aspects of the theories and methods do they consider to be (potentially) applicable or relevant to society. To approach this, we first annotated relevant parts of the interview where researchers were asked about the role of theory and its relation to applicability. We specifically were interested in whether the professors gave examples of specific theories or models (e.g., name, author, year), or whether they referred to a general theoretical framework or subdomain within psychology. Next, we annotated whether participants gave examples of specific applications, or whether researchers referred to general contexts of application or practical settings for which they consider their scientific expertise to be relevant.

Twelve out of thirteen participants gave examples of specific theories or models (e.g., with name, author, year), and seven participants gave at least one example of a general theoretical framework. Furthermore, seven participants gave at least one example of a specific application, and all thirteen participants gave at least one example of a general context of application. Interestingly, there seemed to be some relation between

the participants' domain of expertise, and the theories they were working on. Three professors of social psychology, for example, all mentioned "social identity theory" (Tajfel & Turner, 2004) as one of the main theories that was important to their research, and which they considered to be relevant to various practical contexts and societal issues. Interestingly, one specific theory was mentioned by a professor of clinical psychology and by a professor of developmental psychology, namely the "self-determination theory" (Deci & Ryan, 2000; Ng et al., 2012). Some participants referred to theories and models that they themselves had developed. For example, one professor of clinical psychology explained that he had constructed a theoretical model to explain the process of grief and bereavement, which had become an influential model for clinical practitioners dealing with clients who suffer from grief.

In total, seven out of thirteen participants referred to what we labeled as general theoretical frameworks or subdomains within psychology, for example, theories about visual perception, theories of brain functioning, general principles of attention, psychometrics, psychology of learning, social psychological theories, and dynamic systems theory. Note that we annotated such cases as examples of general theoretical frameworks, as these examples did not mention a specific theory, name, author, or year, but rather pointed to a general framework or set of theories within a particular subdomain of psychology.

In total, seven out of thirteen participants gave examples specific applications. These included, for example, clinical guidelines, follow-up protocols, assessment tools, treatment and therapy programs, advisory reports, and training programs for practitioners. Furthermore, all thirteen participants gave at least one example of a general context of application and several participants gave multiple examples. These general contexts of application consisted of, among others, clinical practice, healthcare, education, sustainable behavior, the judicial system, the well-being of youth, diversity and inclusion, and ethical behavior in companies, political activism, radicalization, traffic and aviation, and advertising and marketing.

What is the Role of Theory in Practical Applicability?

Next, we wanted to focus more specifically on how our participants viewed the role of theory in terms of its practical applicability, that is, to what extent does a psychological theory lends itself to application in a practical setting. We annotated all the parts of the interviews where participants gave examples of either a specific theory or a general theoretical framework, and then we annotated whether participants explicitly related these to either specific applications, or to a general context of application.

Ten out of thirteen professors gave at least one example of a specific theory in combination with a general context of application. These participants gave examples of how specific theories from social psychology (e.g., social identity theory) are relevant to understand and explain various phenomena and social issues in society related to group dynamics, such as diversity and inclusion, (un)ethical behavior in companies, conspiracy thinking, political and religious radicalization, hooliganism, and the multicultural society. A professor of developmental psychology explained that self-determination theory was relevant to understand the discrepancy between

adolescents' concerns about climate change and their (lack of) sustainable behavior. One participant, a professor of cognitive psychology, referred to several theories of attention (bottom-up vs. top-down attention, sensory recruitment theory, attentional capture), which this participant considered to be relevant for advertisers and website designers.

In sum, the most common pattern was that participants gave examples of a specific theory and then explained its relevance or applicability to a general context of application. These findings show that the psychology professors considered psychological theories as a useful source of knowledge to understand and explain various clinical, practical and societal issues. However, it was not always exactly clear how the mentioned theories and frameworks could be practically implemented or translated into a specific application (e.g., tool, product, cf. Klatzky, 2009). Moreover, none of the examples given by the participants seemed to resemble Berkman and Wilson's (2021) notion of a "practical theory," which contains prescriptive steps of action and practical guidelines.

A second pattern we found was that six out of thirteen participants referred to general theories or frameworks and then described their relevance to specific applications. In these cases, no specific theories (e.g., name, author, year) were mentioned. For example, two participants explained how clinical guidelines are established by combining theoretical frameworks together with experiments, clinical research, and observations and experiences from both researchers and clinicians. To this end, no specific theory or model may play a decisive role in the development of clinical guidelines, but rather the accumulated body of scientific knowledge about a disorder or illness, together with what has found to be useful from clinical experience by practitioners may be used to establish clinical guidelines. Furthermore, one participant did not refer to any specific theories but mentioned the practical relevance of insights from cognitive neuroscience to a general context of application, namely working as a clinical neuropsychologist with patients in a hospital. This participant explained that having a general theoretical framework about brain functioning is important to be able to explain to a patient why, for example, an infarct in the brain (i.e., hippocampal area) can cause severe memory problems, which is the reason why the patient cannot remember what her husband said to her yesterday. As this participant put it: "it allows me to explain [to patients and their families] what is almost not imaginable to most people."

Interestingly, only two participants explained how a specific theory was related to a specific application. A professor of clinical psychology explained how various empirical phenomena, such as principles of conditioning, for example, extinction, exposure, habituation, and sensitization, are now considered to be central to the efficacy of exposure-therapies designed to treat people who suffer from phobias and anxiety disorders (see VanElzakker et al., 2014; Wolpe & Plaud, 1997). However, this participant noted that the development of evidence-based exposure-therapies followed a long and winding road before the relevant theoretical principles and experimental results were adequately connected to specific clinical applications (see also Kredlow et al., 2022; Vinograd & Craske, 2020). Furthermore, a professor of experimental psychology explained how specific patterns of brain activity, as measured by electroencephalography

(EEG) that are assumed to reflect distinct neurocognitive processing of proactive and reactive inhibition, could be used for the development of precision psychiatry. That is, predicting which individual patients with attention deficits would most likely benefit from psychopharmacological treatments and which patients do not (Kenemans, 2015). Another example given by this participant was how this knowledge could be used in the assessment and training for pilots, especially in alarm situations. Importantly, this participant emphasized that these examples should be viewed as potential applications, as these had not yet reached a sufficient level of maturity to be implemented (cf. Klatzky, 2009).

What Aspects of Scientific Knowledge Are Useful in Practical Settings?

Many professors of psychology generally regarded psychological theories as relevant or useful, for example, as a framework to explain and understand phenomena and issues in practical and societal settings. A few participants, however, also explained that in their experience, the role of psychological theories in practical and applied contexts is marginal, or at least has a different role than in the realm of basic psychological research. For example, one participant mentioned that when collaborating with societal partners for a municipal research project, the role of theory and the hypotheses and predictions that follow from it were not directly relevant. As this participant put it:

When I collaborate with stakeholders and practitioners [...] I may implicitly use my general theoretical knowledge derived from research, for example, research on dynamic systems theory, but actually the specific predictions of those theories do not play an important role. [...] stakeholders in these projects are primarily interested in simple numbers and statistics and the explanation thereof.

As this example shows, what is especially useful is to have insights and results that can be readily communicated and understood, without having to explain sophisticated theories or models, especially when engaged in the role of scientist-practitioners, consultants, and science communicators. In a similar vein, another participant noted that, “It seems that in a lot of applied research, the role of theory is much less prominent, instead, there is a practical question, and there isn’t a lot of opportunity to have a very fundamental approach to it.”

Aside from the role of specific theories and general theoretical frameworks, other aspects of scientific knowledge were also mentioned by participants as being important or useful when engaging in practical and societal settings. For example, several participants mentioned basic scientific principles and knowledge about methodology and statistics. As an example, one participant mentioned that what’s really useful is if you have a good signal-to-noise ratio, or if some test result yields values that are two standard deviations above the mean, because this allows one to make decisions about, for example, the probability that patient X will most benefit from treatment Y, or that student A will succeed at a particular level of educational performance. In such cases, it is not the role of theory that seems to be the most important, but rather one’s ability to utilize statistical information and evaluate assessments and test results in order to make reliable and efficient decisions.

Other aspects of methodological knowledge and principles were also considered to be highly useful and relevant to practice. For example, several professors mentioned the importance of applying the principles of the empirical-analytical method to practical settings and problems, e.g., evaluating policies in a company, or evaluating a particular intervention in the clinic. As one participant put it:

I think that our methods are also very useful for practice, not just our theories about why people do what they do... having an evidence-based approach in which the empirical cycle of testing is used, but then it is applied to testing and evaluating one's goals and policies... formulating goals that are S.M.A.R.T (specific, measurable, achievable, relevant, time-bound).

Similar approaches have been discussed in the literature, in which the empirical-analytical cycle and its methodological steps—observation and hypothesis formation, derivation of predictions, hypothesis testing and evaluation of results—are slightly revised to address practical problems (De Bruyn, 1992; De Groot, 1954; Niiniluoto, 1993; Simon, 2019; Van Strien, 1997; Wieringa, 2009), for example, in patient diagnosis and design science. One such example is Van Strien (1997)'s regulative cycle, which starts with problem identification, followed by a diagnosis of the problem situation, a plan of action which elaborates a solution or remedy, an intervention (aimed to bring about a change toward the desired goal or criterium), and then finally to the evaluation of the new situation.

How do Researchers View the Relationship between Scientific Knowledge and Practice?

Participants mostly gave examples of specific theories and general contexts of application. Moreover, several participants explained how general insights are relevant to specific applications. Yet, it was not always made explicit how theories and its applications in practice are related. We therefore assessed whether participants explicitly explained the relation between a theory and its context of application.

We used the following categories to label participants' views: If the participant made explicit how a specific application, or the practical context, was derived from, shaped by, changed by, or changeable by the theory, we labeled this as (1) "theory-to-practice." Conversely, if participants made explicit whether a theory was derived from, inspired by, shaped by, changed by, or changeable by the practical context, we labeled this as (2) "practice-to-theory." The next category was labeled the (3) "bidirectional" relation, which would only be assigned if the example was labeled as both "theory-to-practice" and "practice-to-theory." Finally, if the relation between theory and its (context of) application was unclear, or if the relation was simply not described at all we annotated it as (4) "not described."

From Theory to Practice

Twelve out of thirteen participants gave at least one example in which they viewed the relation between scientific knowledge and its context of application according to a theory-to-practice model (Klatzky, 2009; Medin, 2012; Niiniluoto, 1993; Roll-Hansen, 2017). When discussing the role of theory in relation to its context of application, the participants regarded psychological theories as relevant and explained

that they can have implications for how things in practical settings can be understood, explained, or changed, in some way or other. One illustrative explanation was given by a professor of social psychology who studies group dynamics in organizations:

From economic theories it is often assumed that people do things in their own interest, but social psychology has shown that they don't, because there are all kinds of social group processes going on and social groups are important for people [...] people may do things because the group demands it, or because people want to be part of a group, and that is an important insight for organizations [...] how can one stimulate good behaviour? By means of sanctions, or by changing group norms? [...] One may think that people will simply work harder if they get paid more, but that's not the case either, because people also compare themselves to each other, so their perception of fairness plays a role. Our theories, which usually are about social identity and group comparisons, are very useful because we can explain why some policies don't work as expected.

Another theory-to-practice example was given by a participant who conducts research on behavioral change in children and adolescents:

What we try to do is, I do not call it interventions but rather, experimental manipulations. We use a relatively controlled setting and try to influence sustainable behaviour of adolescents [...] the ultimate goal is, but we're not there yet, to distil principles from these "proof-of-concept" interventions, with the next step to study whether it works in the real world. So, the sequence I follow is, first in a controlled situation test the mechanisms, and then work towards applicability in a real intervention.

From Practice to Theory

Two participants gave at least one practice-to-theory example, that is, how insights from practice had inspired and progressed theories and experiments in clinical and developmental psychology. One participant explained how EMDR (eye movement desensitization-and-reprocessing), which is now an evidence-based treatment for post-traumatic stress disorder (PTSD), started as a therapeutical claim by Shapiro (1989) with little to no scientific basis. As this professor of clinical psychology explained:

Shapiro claimed that EMDR could be used to treat all sorts of things, and the rationale behind it was completely incomprehensible to me, a sort of crypto neurology about balancing dysfunctional memory systems. Seriously, at the time I thought, this has to complete hogwash, so I tried to debunk it experimentally, using a proper control group, different tasks and so on, but as it turned out, the EMDR condition with eye movements worked much better than doing nothing, or using other distracting tasks... and now we know that it really seems to be about taxing working memory during recall of traumatic events... it has really stood the empirical test.

A second example of practice to theory was given by a professor of developmental psychology who started out as a clinical and developmental psychologist in the 1980s working with prematurely born infants and infants from drug addicted mothers. As this participant explained:

The basic research questions primarily arose from my work in the medical practice, very simply put, how will these children develop? Will they turn out okay? There hardly was any theory behind it, but rather just common sense. Now we have theories like the

differential susceptibility hypothesis and the diathesis stress model which are basically risk models in the sense that more (perinatal) risk factors equal a higher probability of atypical development.

These practice-to-theory examples show that some theories and clinical treatments were derived from practical insights and observations, instead of being derived from lab-based studies *via* the theory-to-practice model. In a recent review by Kredlow et al. (2022), the authors discussed this phenomenon by evaluating differences in development between lab-inspired treatments and treatments that were inspired by insights from clinical practice. As Kredlow et al. (2022, p. 1121) put it, “When discussing translational research, the focus is often unidirectional, namely translation from the laboratory to the clinic.” Interestingly, Kredlow and colleagues discuss several examples in which applications derived from laboratory studies for the development of clinical treatments have proven to be difficult or unsuccessful. In contrast, clinical treatments that were inspired by insights from practice have proven to be successful and are now part of evidence-based treatments and standard practices of practitioners. Interestingly, one of the participants made a similar observation:

I don't think this is an incidental finding, that all kinds of phenomena that have been carefully examined in the lab and show a high degree of robustness are actually very hard to apply, whereas something like EMDR, that had no theoretical foundation whatsoever, actually turned out to work very well.

Bidirectionality

The bidirectionality model posits that the relationship between scientific knowledge and its practical applicability can be characterized as a continuous interaction between scientific research and insights from practice (Medin, 2012; Niiniluoto, 1993; Roll-Hansen, 2017). By our definition, bidirectionality implies that not only a theory can shape the way things are done in practical settings, but also that the theory is or can be shaped by insights from practice. None of the participants provided any specific examples in which this continuous interaction was described at a sufficient level of detail to determine how theory and practice had changed or shaped each other. In fact, eight out of thirteen participants gave at least one example in which the relation between theory and practice was not described at all. The closest example of bidirectionality was given by participants who work on establishing clinical guidelines. As mentioned earlier, clinical guidelines and best practices are typically constructed by an (international) expert panel of both researchers and clinicians.

Some participants did reflect on a more general level that theory and practice can inspire each other, or that insights from both scientific research and practical experience together advance knowledge, but these reflections did not include a reference to a specific theory of practical application. For example, one participant reflected on this interaction between science and practice as follows:

There is a constant dialogue between practitioners, researchers, and for that matter, academia as a whole, which still can be improved, let's make that clear. There are many efforts to, on the one hand, stimulate research based on practical questions, and on the other to offer theoretical frameworks and research methods that are suitable to the questions. That is where I see valuable progress.

Interim Conclusion #2. The majority of participants gave examples of the relationship between scientific knowledge and its practical relevance according to a theory-to-practice model, and most examples described how specific theories were relevant to general contexts of application. Only two participants gave examples of how a specific theory was related to specific applications. Furthermore, two participants who work as a scientist-practitioner in clinical practice gave practice-to-theory examples in which theories, models, and applications were inspired by insights from practical settings. Overall, participants were certainly interested in the societal relevance and practical applicability of scientific knowledge, but it was not always described how a given theory was related to a specific application, for example, a tool, product, treatment program, advisory report, or policy. According to some participants, the role of theory seems to play a different or less prominent role in many of the practical settings and activities that participants engaged in.

Based on these parts in the interview, one could argue that there is a gap between theory and practice as described by Berkman and Wilson (2021). According to Berkman and Wilson (2021), theories in psychology are often of a general and descriptive nature, but to be applicable in practice a good theory needs to start with a practical problem based on a rich description of the problem in context. Importantly, to be useful in practice, a practical theory aims to solve a particular problem, provides rules and criteria for evaluative judgment, and suggests concrete steps for action and decision-making. In several examples given by participants, it was not clear to what extent the relation between theory and practice was at that level of applicability, in and many cases, it was explicitly mentioned by participants that the theories they are interested in are of a general and descriptive nature. Although we only interviewed a small sample of Dutch psychology professors, these findings seem to converge with Berkman and Wilson's (2021) notion that psychological theories are not practical or directly applicable. Nevertheless, as discussed in Theme 1, most participants regularly engage in a variety of public and societal roles, which suggests a discrepancy with the aforementioned claim that psychologists struggle to be societally relevant. We will discuss this discrepancy in more detail in the discussion.

Theme 3: What Challenges and Obstacles Do Researchers Experience in the Communication, Translation, and Application of Psychology to the Practical and Societal Realm?

Participants gave several examples of how they experienced challenges and obstacles when connecting science with society. Some examples reflected issues discussed in the introduction, such as the challenges resulting from theoretical and methodological differences between lab-based research and research in applied settings. One participant commented that in clinical settings it was often not possible to have the optimal conditions of a randomized-control trial, as patients are using various medications and, or are part of different therapy programs simultaneously, which makes it difficult to test the efficacy of a specific treatment. Likewise, another participant mentioned the difficulty of having the desired experimental conditions for

psychophysiological measurements when conducting research in a field setting. To overcome this problem, this professor's plan is to design a mobile laboratory which can be used to conduct experiments outside the university with a representative group of participants (e.g., employees in companies), instead of mainly relying on student populations.

A second challenge mentioned by participants are the differences in work dynamics and expectations between academia and societal partners (e.g., companies, governmental agencies). One participant explained that in academia, there's room for slow research and small steps; one may spend four years on a specific set of questions, whereas in projects with corporations and governmental agencies there is a demand for fast results and the criteria for success are different. Moreover, there often are continuous changes in the interests and commitments by societal partners and stakeholders to collaborate with researchers.

A third challenge was mentioned by participants who regularly engaged in science communication. These participants mentioned that it can be challenging to simplify detailed and nuanced scientific insights into statements suitable for a newspaper, tv or radio program. For example, communicating the uncertainty and probabilistic nature of scientific results and conclusions without giving the impression that they are just an opinion. Also, some participants mentioned that it can be difficult to stay within one's area of expertise, as people may ask all kinds of questions just because they are talking to a professor of psychology. As one participant put it, "You want to demonstrate the societal relevance of your research, but you also want to be very precise, your colleagues may be watching, and one doesn't want to be tempted to claim things that one cannot really claim." Another participant said, "We need media training for scientists, and give each other the confidence to go out there, check on each other and discuss what we can and cannot claim. Don't be too cautious, you have to say something."

Another challenge is the scarcity of time to engage in activities to connect science with society. Being a research professor is a demanding job that involves teaching, student supervision, and writing and reviewing articles and grant applications. Interestingly, to deal with time constraints, some participants had dedicated appointments in which time and resources were specifically budgeted for outreach, public engagement, and setting up collaborations with societal partners.

Theme 4: How do Researchers View Changing Trends in the Emphasis on Societal Relevance of Scientific Knowledge?

As a final part of the interview, we asked participants whether they perceived a change in emphasis on the societal relevance of research in recent years. Most participants agreed that there is currently more emphasis on societal relevance, as compared to when they started out their academic career. While some participants were enthusiastic about this development, others were more skeptical. Some participants regarded this emphasis as part of a recurrent cycle between basic (fundamental) research and research that is more focused on practical applicability and societal relevance, which changes with governments, university boards, and political events.

We specifically asked if participants noticed these changes in the requirements of grant applications and funding agencies, and in the aims and scope of academic journals. While most participants agreed that societal relevance has become a common requirement of grant applications, they also noticed that the academic journals did not seem to have changed a lot (for a discussion on this topic, see Rodrigues & Verstraten, 2021). Most journals are focused on either basic or applied topics, with the occasional interest in some applied questions in the basic journals. Some participants believed this will not change, mainly because scientists themselves seem to be more interested in basic research, whereas others said this is because there are also journals that are dedicated to applied research topics and journals for practitioners. As one professor of social psychology mentioned:

I don't see a lot of changes at the journals, but maybe I am a bit stuck on the journals that I usually publish in [...]. I am also an editor of a psychology journal, and we do focus on the implications and applicability, but not more than 20 years ago by my estimation. The implications of the studies are typically discussed in the discussion section. However, there are several journals dedicated to applied topics in (social) psychology, and some of them are considered very good or perhaps even better in terms of impact compared with some of the more fundamentally-oriented social psychology journals.

On the point of changing criteria by funding agencies, one professor of clinical psychology mentioned that the creation of incentives and policies for researchers to focus more on societally relevant topics and applicability may also have negative consequences:

One negative consequence of such policies is that researchers will simply start to make up stories about societal relevance, because a large premium has been created for marketing-talk about potential applicability and relevance.

Furthermore, a professor of cognitive psychology mentioned another potential negative consequence on the increased emphasis (by universities and funding agencies) on societal relevance:

We should be beware that everyone still feels welcome at the university [...] I sometimes get the idea that by stressing the importance of societal relevance, some researchers may feel excluded. If all our research needs to fit into strategic-and-societally relevant themes, which our university emphasizes a lot these days, this may cause a certain type of researcher to think that they are no longer relevant.

Discussion

The present study was sparked by recent discussions about the potential lack of practical applicability and societal relevance of psychological research (cf. Berkman & Wilson, 2021; Giner-Sorolla, 2019). Interestingly, such discussions have been a recurring topic of debate in past decades (Klatzky, 2009; Miller, 1969; Sherif, 1970; Silverman, 1971; Van Strien, 1966, 1997; Zimbardo, 2004). Hitherto, most studies and discussions on the relation between psychological science and its benefit to society have been discussed from a bird's eye view, for example, by identifying general trends such as psychology's dominant focus on lab-based experiments and general descriptive theories, or concerns

about the limited validity and generalizability of psychological research (Berkman & Wilson, 2021; Giner-Sorolla, 2019; Silverman, 1971). To assess how such concerns are actually perceived by researchers in their daily scientific practice, we interviewed thirteen psychology professors from different disciplines to gauge their perspectives on the relation between psychological science and its practical applicability and societal relevance. We first briefly recap the main findings, and then discuss these results against the background of the main concerns and explanations raised in the literature about the lack of practical applicability and societal relevance of psychological research.

Our first research question was what roles and activities researchers in psychology engage in to connect their scientific knowledge with practical and societal domains. We found that professors of psychology occupied a range of different public and societal roles in practical and applied settings and engaged in various activities to connect science with society (scientist-practitioner, consultancy, science-communication, education). As such, based on the interviews, the claim that psychology suffers from a lack of practical applicability to address practical and societal issues (cf. Berkman & Wilson, 2021; Giner-Sorolla, 2019) was not reflected in the various activities of our sample of psychology professors.

Our second research question was how professors of psychology view the relation between scientific knowledge and its (potential) applications, and what aspects of scientific knowledge they considered to be applicable to the practical and societal realm. We found that most participants' examples followed a theory-to-practice model (Medin, 2012; Roll-Hansen, 2017). Participants mostly referred to specific theories within their area of expertise which they considered as (potentially) relevant to general practical settings and societal domains. Also, many participants described how general theoretical frameworks and subdomains of psychology are relevant to specific applications. Only two participants mentioned how a specific theory was related to specific application. Furthermore, several participants specifically pointed to how different aspects of methodological knowledge and procedures (e.g., statistics, experimental research designs) are relevant or applicable to various practical problems and applied settings.

Our third research question was what challenges and obstacles researchers in psychology experience in the communication, translation, and application of psychological science to the practical and societal realm. We found that several participants' responses also reflected the general concerns mentioned in the introduction, such as challenges in the communication of science to society (e.g., accessibility), as well as a range of methodological and practical challenges when doing research in applied settings (e.g., lack of experimental control, different criteria and expectations, limited time and resources). Importantly, we found that several challenges that were mentioned by participants were very context-specific and dependent on the particular roles and activities participants engaged in (e.g., clinical practice, consultancy, science communication).

Our final research question was how researchers view changing trends in the emphasis and demand for practical applicability and societal relevance of scientific knowledge. We found that most participants perceived a clear increase in emphasis on the societal relevance of scientific research over the past two decades (e.g., reflected in criteria and requirements by funding agencies, emphasis by academic institutions), but this

change is not, or only slightly, visible in the academic journals and at scientific conferences.

Does Psychology Really Suffer from Crises of Practicality and Societal Relevance?

In recent years, several researchers have argued that psychological science lacks practicality and societal relevance, which has been attributed to the dominant focus by researchers on general theories and lab-based experiments in psychology, the limited reliability and validity of research findings, particular incentives and rewards in academia, and problems in the linkage systems between science and society (Berkman & Wilson, 2021; Giner-Sorolla, 2019; Medin, 2012; Weiss & Weiss, 1981). Such explanations have been buttressed by, for example, evaluations of what leading academic journals in psychology tend to be interested in, and how psychological research is generally communicated in academic journals (e.g., technical jargon, no explicit focus on practical implications). Interestingly, in our study with a small Dutch sample of university professors, most psychology professors we interviewed occupied various roles and engaged in many activities within different practical and societal domains, aside from conducting research and publishing in academic journals. As such, this finding seems to be at odds with how critics in the literature have talked about a crisis of practicality and societal relevance.

When asking professors of psychology about what aspects of their scientific knowledge and expertise they considered to be applicable or relevant to the practical and societal domain, most theories that were mentioned were not described as being directly related to a specific application. Instead, participants often described the role of theory as relevant to a general context of application, e.g., by providing a theoretical framework to understand and explain various phenomena they encounter in practical settings or society at large. As such, this finding converges with Berkman and Wilson's (2021) notion that many (if not most) theories in psychology are formulated in a general and descriptive way, and do not contain context-specific prescriptions that can be used by practitioners, stakeholders or decision-makers. However, as discussed in Theme 1, most participants engage in a variety of public and societal roles despite the lack of a practical theory, which suggests a discrepancy with the aforementioned claim that psychologists struggle to be societally relevant. As such, we think that the general claim that there is a crisis of practicality and societal relevance in psychology does not seem to be completely warranted (cf. Berkman & Wilson, 2021; Giner-Sorolla, 2019). While many professors acknowledged that their scientific theories and empirical work is not (always) directly instrumental or prescriptive in how they engage in their public and societal roles, they still have found a way to engage with their public and societal roles.

How to explain this discrepancy? Perhaps this discrepancy arises due to how one defines what a practical theory is and what one expects or demands from a scientific theory. As discussed in the introduction, to be considered a practical theory, Berkman and Wilson (2021) seem to aim for what Niiniluoto (1993) refers to as "technical norms": "[technical norms] are not descriptive statements about the world. They do not tell us what is, was, or will be, but what ought to be so

that we can attain given goals.” (p. 14). Simply put, if the goal is to achieve A, and you think you are in situation B, you should do X. Technical norms contain both prescriptive, evaluative, and normative terms, and as such, differ substantially from the descriptive and explanatory aims of most basic research in psychology (as well as scientific research more generally). However, as Niiniluoto (1993, p. 13) explains:

In many cases, however, there is not available any general theory from which a technical norm can be deduced. Instead, technical norms are supported “from below” by building up a simplified model of the situation, using trial-and-error procedures and experimental tests to investigate the dependences between the most important variables, and trying to find the optimal methods of producing the desired effects.

In other words, there is no single recipe to deduce prescriptive and normative terms from basic research. To be able to do so one not only needs to have a solid grip on the relevant variables specific to the problem of interest, but also know how they are to be influenced to get the desired effect. As such, we certainly agree with Berkman and Wilson’s (2021) claim that most psychological theories are not practical. However, to claim that the bulk of psychological research has no practical significance (a “practicality crisis”) because many researchers and academic journals in psychology tend to focus more on general theories and laboratory experiments does not seem to be completely warranted. Notably, the notion of a “practical theory” sets a rather demanding standard to what one can expect from a scientific theory, especially in the social and behavioral sciences. Furthermore, it seems to overlook the complicated process of how basic research (knowledge production) is to be cultivated and developed into its applied forms (knowledge transformation)(see also (Benneworth & Olmos-Peñuela, 2018; Stokes, 2011). As both Klatzky (2009) and Medin (2012) have argued, the chain of development from basic research to its applied forms often includes multiple steps and stages before a theory reaches a sufficient level of maturity that allows for applications. As discussed by one participant, in hindsight one could argue that, for example, the principles of conditioning discovered by animal learning psychologists in the late nineteenth century and early twentieth century directly led to the development of clinical treatments such as exposure and extinction therapies. However, the actual history shows that this was not that straightforward, as the participant also explained (see also Kredlow et al., 2022; Vinograd & Craske, 2020). To take another example from vision science and experimental psychology, one could in hindsight argue that the Young-Helmholtz theory of trichromatic color vision was directly instrumental in the development of color-TV, but in fact the development spanned many decades, included both theoretical and experimental work, and involved many trials and errors (Rodrigues & Verstraten, 2021).

The idea that basic research always precedes its applications—the theory-to-practice model—does not always hold up. As discussed earlier, the history of EMDR, which is now an evidence-based treatment for post-traumatic stress disorder (PTSD; American Psychological Association, 2021; International Society for Traumatic Stress Studies Guidelines Committee, 2019), was inspired by insights from practice and only later became an accepted clinical treatment after it was subjected to experimental testing in laboratory settings. In this case, experimental studies in controlled laboratory

experiments have contributed to a better understanding of the mechanisms behind EMDR and its clinical efficacy (van den Hout et al., 2011; van den Hout & Engelhard, 2012). The main idea behind translational research seems to be that basic research needs to be translated into clinically applied interventions. However, several examples in psychology show that it can work well in the other direction too, following a practice-to-theory or a clinic-to-lab model (Kredlow et al., 2022, for a discussion), in which practical insights and experiences can provide the basis for theoretical and experimental work. Also, practical insights, skills, experience, and rules of thumb may be effectively used in practical settings to solve problems, without any exact scientific understanding of why it works as it does. As such, the role of scientists could then be to put these practical insights to the empirical test, following what Niiniluoto (1993, p. 11) has referred to as the “scientification of background knowledge serving a practice.”

On the Terminology of Theory and Application

Throughout this study, we have used the terms theory and application relatively loosely. It is important to note that these terms seemed to have different connotations for participants. For example, we encountered a range of different examples that participants subsumed under the term theory. These included empirical observations and phenomena, psychological constructs, models, experimental paradigms, operationalizations, mechanisms, general theoretical and conceptual frameworks, and subdomains within psychology. This certainly resonates with what Merton (1967, as cited in Sutton & Staw, 1995, p. 371) once wrote about the notion of theory in the social sciences:

Because its referents are so diverse—including everything from minor working hypotheses, through comprehensive but vague and unordered speculations, to axiomatic systems of thought—use of the word often obscures rather than creates understanding.

In our view, a similar case can be made for the term “application.” Participants mentioned many different examples, such as clinical and medical guidelines, follow-up protocols, tests and assessment tools, treatments and therapy programs, advisory reports for governmental agencies, evaluating policies in companies and organizations, training programs and workshops for practitioners, and more. Although the notion of application may suggest a ready-made, off-the-shelf solution to solve a practical problem, the examples given by participants are not well described by subsuming them all under the banner of “application.” As discussed in the introduction, the framework of “basic” and “applied” research has been criticized extensively by scholars from science, innovation, technology, and policy studies, and the interested reader is referred to Stokes (2011), Benneworth and Olmos-Peñuela (2018) and Gibbons et al. (1994). Although we think that within psychology the “basic” vs. “applied” dichotomy still seems to hold sway among many researchers, discussions by Medin (2012), Klatzky (2009) and Van Strien (1997) have also pointed to the necessity of more specific distinctions in terminology.

Should Researchers Stress Practical Applicability and Societal Relevance?

Some researchers in the literature have argued that researchers should stress the practical implications of research more. Our interviews revealed that many professors of psychology viewed the current emphasis on societal relevance as important, long overdue, or even as a duty to society. Some participants we interviewed even had specific appointments to focus more on societal issues, engage in outreach and public engagement, and to establish collaborations with societal partners and stakeholders. In fact, all participants had some kind of engagement with practical and societal issues, as was clear the different roles and activities they engaged in outside of doing research. One could wonder whether this finding is the result of a sampling bias, that is, perhaps we only recruited and interviewed professors of psychology who are specifically oriented toward societal and practical issues as a result of the changing emphasis by universities and funders. Indeed, several participants are involved in research projects that focus on current societal issues (e.g., diversity and inclusion, ethical behavior in companies, sustainable behavior in children, polarization and radicalization of groups in society). However, most professors we interviewed were appointed to their position when the universities and funders in the Netherlands did not yet stress the importance of societal relevance as much as nowadays. Arguably, the career-structures of the new generation of professors in the last decade have indeed been shaped by the emphasis on societal relevance, however, all professors we interviewed engaged in some societal and public roles while most of them did not need the current incentives by the academic-reward system to do so to promote their careers.

Some participants regarded the current emphasis on societal relevance as a marketing strategy employed by universities. Others viewed it as part of a recurring cycle of emphasis between basic and applied topics which are influenced by ever changing political and societal events. Several participants also expressed concerns about placing too much emphasis on practical applicability and societal relevance, for example, because it may come at the cost of some areas of basic psychological science where the case for practical applicability and relevance to society is not easily made (see also Rodrigues & Verstraten, 2021, for a discussion). In a similar vein, Almeida (2022) has recently argued that in some countries there is a trend toward underfunding basic psychological science and focusing mostly on applied topics in psychology. According to Almeida (2022), prioritizing current societal issues will create a myopic focus on short term solutions and a demand for quick fixes that are not likely to provide a solid foundation to solve both our current and future societal challenges. Most of our participants had noticed a clear shift toward more societal-and-practically oriented research in the past twenty years or so. Yet, there has also been pushback by researchers warning for the long-term consequences of underfunding basic research (Poot, 2021). In sum, we agree that not all scientists should or need to be focused on the practical applicability and societal relevance of their work. Much is to be gained from basic research on human behavior and cognition. Conversely, if there is an interesting practical or societal problem, it is also likely to be an interesting theoretical or experimental problem. A diversity of perspectives seems to be key.

As a final set of remarks, we think that the practical applicability and societal relevance of psychological research warrants more theoretical discussion, as well as empirical work. For example, how do researchers in psychology differ across different areas of expertise, levels of experience, and across different countries, with regards to how they view the role of psychological science in society. In this study, we primarily focused on psychology professors, but a broader survey of researchers at various stages of their career can be illuminating as well. To conclude, the main goal of this paper was to examine how individual researchers view the relationship between scientific knowledge, its applicability, and societal relevance, and we focussed specifically on how researchers view the role of theory and its (potential) applications when engaging in practical and societal domains. One interesting avenue of future work could be on how the underlying social and political visions of psychologists regarding their (changing) roles in society, such as scientist-practitioners, educators, consultants, science-communicators, society's problem-solvers or activists for societal and political causes, may influence their engagement and relationship with society at large.

Note

1. https://en.wikipedia.org/wiki/List_of_psychology_journals.

Author Contributions

Conceptualization: Authors GH, IH, CK, RH. Methodology: GH, IH, RH. Investigation: GH. Writing—Original Draft: GH. Writing—Review & Editing: IH, CK, RH. Visualization: GH. Supervision: RH, IH. Funding acquisition: CK.

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Data Availability Statement

Data of this study are available upon reasonable request.

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Appendix A. Interview template

Questionnaire Template for Interview

Start with a Brief Explanation of the Study

Thank you for participating in this study. For this interview, I will ask you several questions about the relation between your area of scientific research within psychology and the potential implications and applications for society. The goal is to uncover how different psychologists from different backgrounds think about the relation between scientific knowledge and its practical and societal applicability.

Theme 1: What Roles and Activities Do Researchers Engage in to Connect Their Scientific Knowledge with Practical and Societal Domains?

1. Can you briefly describe your research interests and area of expertise?
2. How do you view your role as a scientist in society? What kind of roles and activities do you engage in to connect science and society?
3. Have you ever been approached by people/organizations to collaborate or to apply your scientific knowledge and expertise for a practical/societal problem/question?
4. If yes, what kind of people/organizations? How did this come into being? What was the question/problem? What was the goal of the assignment?
5. Do you think it is important that scientific theories are applicable?

Theme 2: How Do Researchers View the Relation between Scientific Knowledge and Its (Potential) Applicability, and What Aspects of Scientific Knowledge Are Applicable to the Practical Realm?

You have just described your area of research/research interests. Now I am interested in what kind of scientific knowledge (e.g., theories, methods) do you consider to be applicable to practical/societal problems?

1. Could you give an example of a theory (preferably with author name and year) that you are interested in and work with?
2. Do you think this theory is applicable and why?
3. Can you give other examples of theories that you find applicable?
If yes, what aspects of these theories makes them applicable?
4. Can you give an example of a theory that is not applicable at all? And if yes, why do you think it is not applicable?

Theme 3: What Challenges and Obstacles Do Researchers Experience in the Communication, Translation, and Application of Psychology to the Practical and Societal Realm?

1. What kind of challenges/obstacles do you perceive or experience when translating your scientific research to society?
2. Have you ever experienced a lack of communication between science and practice?
3. Do you think that scientific jargon and technical details of research inhibit the practicality and usability of scientific research for practitioners/policy makers?
4. Do you have some solutions or strategies that you use to enable the communication and translation of science to society?
5. What is your opinion about involving stakeholders/practitioners with your scientific research? (e.g., with the shaping of a study, or writing grant proposals?)

Theme 4: How Do Researchers View Changing Trends in the Emphasis on Societal Relevance of Scientific Knowledge?

1. Do you think it is important that scientists actively engage with societal/political issues and public decision-making? And if yes, what is the role of the scientist in this process?
If not, why not?

2. Have you experienced or perceived a change during your career as a scientist in the ways that the societal relevance of psychological research is emphasized? If yes, in what ways?
3. Do you think that academic institutions/universities stimulate scientists to engage in applied or societal-oriented research? If yes, in what ways? How can you tell?
4. Do you think that the academic journals/scientific conferences that you publish in and attend have changed in their emphasis on societal relevance and practical applicability? If yes, in what ways? (e.g., specific criteria regarding societal relevance, etc.)