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Do We Report the Information that is Necessary to Give Psychology Away? A Scoping Review of the Psychological Intervention Literature 2000-2018

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Abstract
Psychologists are spending a considerable amount of time researching and developing interventions, in hopes that our efforts can help to tackle some of society's pressing problems. Unfortunately, those hopes are often not realized—many interventions are developed and reported in our journals but do not make their way into the broader world they were designed to change. One potential reason for this is that there may be a gap between the information reported in our papers, and the information others, such as practitioners, need to implement our findings. We explored this possibility in the current paper. We conducted a scoping review to assess the extent to which the information needed for implementation is reported in psychological intervention papers. Results suggest psychological intervention papers report, at most, 64% of the information needed to implement interventions. We discuss the implications of this for both psychological theories and applying them in the world.

Keywords
meta-science, psychological interventions, implementation, scaling, social cognition

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"I get tired of research that never gets used…the question is when will we take all that energy and all the wonderful things that you do and make it work for the people"
-Congressman Elijah Cummings, Society for Research on Child Development, 2019

One of psychology's longest re-occurring calls is to do whatever we can to "give psychology away" (Forscher, Vazire, & Anvari, 2020; Miller, 1969). In the 1940s, Kurt Lewin encouraged researchers to engage in "action research," particularly that which could improve intergroup relations (Lewin, 1946). In the 1990s, there were discussions about the role psychological research could and/or should have in shaping our laws (Ellsworth, 1991). And most recently, in the 2010s, there were calls for governments to develop councils of psychological advisers, similar to the Council of Economic Advisors, an agency within the executive office of the President of the United States, who could help to ensure that the policies we set are psychologically informed (Schwartz, 2012; Sunstein, 2016; Teachman, Norton, & Spellman, 2015). The rationale for this most recent push is that psychologists have done so much intervention research that our expertise could ostensibly be leveraged to cultivate a healthier, happier, and more sustainable world (Gruber, Saxbe, Bushman, Mcnamara, & Rhodes, 2019). On their face, these calls seem like a great idea. Psychologists have long conducted intervention research that can speak to and potentially help to address a variety of pressing social problems (Suarez-Balcazar, Balcazar, & Fawcett, 1992).

In practice, however, it is presently unclear whether the decades of intervention research psychologists and other social scientists have conducted is, in fact, ready for broader implementation and scaling (Goroff, Lewis, Scheel, Scherer, & Tucker, 2018). For psychological interventions to have the societal impacts we aspire to have as a field (Teachman et al., 2015), psychologists must—at the very least—report the information that practitioners wanting to implement our research would need to implement it successfully. Practitioners would need to know: how differences in social contexts influence intervention efficacy; precisely what types of independent and dependent variables have been examined and what that means for implementation and scaling efficacy; how attitudes, goals, or identity factors influence people's responses to interventions; how dosage and the timing of the intervention matter for uptake and maintenance; how the source or other intervention agents of change (e.g., doctors, teachers, government officials) influence the efficacy of the intervention, and much more (Earl & Lewis, 2019; Goroff et al., 2018). Without knowing and reporting these things, well-intentioned interventions designed to improve outcomes may have many unintended, life-altering consequences for the people being intervened on. Moreover, policymakers and practitioners whose job it is to decide how to intervene, need to know what to expect, how to plan, and forecast returns on intervention investments. These are necessary steps in making decisions regarding the adoption, implementation, and scaling of interventions.

Unfortunately, psychologists have traditionally been ill-equipped to take on the challenge of translating insights from our studies into effective interventions that can be brought to scale (Yeager, et al., 2016). We often conduct our research in laboratory settings (Baumeister, Vohs, &

Funder, 2007; Sears, 1986) with samples that are not representative of the broader world to which we wish to generalize (Henrich, Heine, & Norenzayan, 2010; Lewis, 2019; Simons, Shoda, & Lindsay, 2017). We are also not well-versed in considering and reporting the costs and benefits of implementing interventions in a resource-constrained world (Forscher et al., 2020; Sunstein., 2015). These may not be big problems for research aiming to make incremental advances to abstract theoretical propositions, but it is a problem in the realm of intervention research: it is extremely rare for interventions that change outcomes in the laboratory to translate to the world outside of the lab with high enough fidelity to be practically meaningful (DeAngelis, 2010). As Yeager and colleagues (2016) noted, "although promising, self-administered psychological interventions have not often been tested in ways that are sufficiently relevant for policy and practice" (p. 375). This contributes to the substantial gap that exists between research and practice (Institute of Medicine (US) Committee on Health and Behavior: Research, 2001).

To address this gap, researchers and practitioners have developed a series of frameworks and guidelines for conducting and reporting research in ways that would make it possible to use the research for practice. One such framework is the *Reach*, *Efficacy*, *Adoption*, *Implementation*, and *Maintenance* (RE-AIM) framework that was originally developed by Glasgow and colleagues (1999) to provide guidance on how to conduct research in this way in the field of public health. Since the first version in 1999, RE-AIM has evolved considerably in its usage over the past 20 years (planning, reporting, reviews) and applied in various fields (e.g. environmental change, health policy, ageing, childcare, quality improvement) and in clinical, community, and corporate settings (Glasgow, et al., 2019; Gaglio, Shoup, & Glasgow, 2013). RE-AIM outlines multi-level (individual and setting) and multi-stage indicators (planning, evaluation, reporting) that are essential to consider to achieve sustained population-level effectiveness of interventions (Stenhouse, 2017; Gaglio et al., 2013). *Reach* assesses whether the sample being studied is representative of the target population of interest by examining the number, proportion, and representativeness of the participants in a study. *Efficacy* assesses the impacts of the intervention on participants by considering factors like effects on quality of life, economic impact, as well as negative effects. *Adoption* assesses the feasibility of translating between the setting of the intervention study and the setting(s) in which the intervention would actually be disseminated, and considers factors like the number, proportion, and representativeness of stakeholders who would be willing to implement the intervention. *Implementation* assesses factors related to implementation fidelity: how closely must implementers adhere to the original protocol to achieve the same outcomes as the original researchers and how much time and money would that take. Finally, *Maintenance* assesses factors associated with long-term follow up (to the extent that it is desirable); it focuses on how long researchers followed-up with participants and organizations to determine long-term impact.

Current Study

In the current study, we used the guidelines described above from the implementation science literature to assess the extent to which (a sample of) the psychological intervention literature provides the information required for successful implementation, herein referred to as

implementation information. To do this, we conducted a scoping review of, and used an implementation science inspired checklist to code, articles published in the past two decades about five categories of psychological interventions that were designed to drive social change in a variety of domains, and have become well-known in public discourse: belonging (Walton & Cohen, 2011), growth mindset (Aronson, Fried, & Good, 2002), utility-value (Hulleman & Harackiewicz, 2009), self-affirmation (Cohen, Garcia, Apfel, & Master, 2006), identity-based motivation (Oyserman, 2015), as well as interventions that combined elements of these. We chose these interventions because they have been studied in a multitude of settings by researchers across various sub-disciplines in psychology (e.g. educational, social, organizational, clinical), as well as in neighboring disciplines (e.g., business, communication, education, and public health). As such, we are biasing the sample of articles in our scoping review toward articles about interventions that have been thoroughly studied and tested, and therefore should be the most "shovel ready" for dissemination and implementation. To maximize the chances of implementation readiness of the interventions in the articles we coded, we opted to include articles from the most recent years of research, the years 2000-2018, allowing some time after the initial stages of intervention creation to get them closer to dissemination readiness. While these interventions were conducted in various settings to improve specific outcomes for different target populations, to give readers some familiarity with the general concepts behind each intervention, Table 1 provides a descriptive overview of how the interventions were applied in educational settings to improve student outcomes.

Table 1. Descriptive Overview of the Five Interventions.

Intervention name	Intervention Description
Self-Affirmation	Self-affirmation interventions are "designed to specifically target self-confidence in an attempt to find methods that lead to higher test scores. This self-affirmation exercise is aimed to function as a "catalyst" that boosts students' self-confidence and self-integrity while allowing their abilities to be unencumbered, translating, theoretically, into better performance (Purdie-Vaughns et al. 2009 as cited in Bratter, Rowley, & Chukhray, 2016).
Identity-based motivation	IBM interventions are used to improve student outcomes by helping "students imagine school as the path to their future, generate strategies to succeed on that path, and see obstacles and failures along the way as signaling importance and value" (Horowitz, Sorensen, Yoder, & Oyserman, 2018, p. 12)
Growth Mindset	Growth mindset interventions "aim to convince students that rather than being fixed and finite, intelligence is malleable, and one can become smarter and more successful in school by working harder" (Broda, et al., 2018, p. 319)
Utility Value	"The UV intervention targets different psychological processes critical to student achievement: perceived value of and engagement in coursework. It is a curricular intervention in which students write short essays about the personal relevance of course material." (Harackiewicz et al.,2015, p.3)
Belonging	Belonging interventions "aim to help disadvantaged students reframe worries they may have about fitting in as normal, rather than as reinforcement of societal and institutional signals that they do not belong or are unable to succeed." (Broda et al.,2018, p. 319)

We had four primary descriptive goals in this endeavor: first, to get initial estimates of the state of implementation information available in the literature on psychological interventions; second, to determine the types of implementation information that are typically published in the psychological intervention literature; third, to identify gaps between implementation information that is published in the psychological intervention literature and the information required for practitioners to implement them; and fourth, to discuss the implications of any gaps that exist for both theory and practice. To be clear, the goal of the current paper is to begin to *describe* the state of implementation information in published psychology research on social interventions; descriptive research is, in its own right, essential for the advancement of our science (Rozin, 2009). The goal is *not* to compare or rank sub-fields or researchers. Because our goal is *description* rather than *comparison*, we will employ the method of a scoping review rather than a systematic review or other meta-analytic techniques.

Method

Brief Primer on Scoping Reviews

Scoping reviews provide an overview of topics or fields by systematically mapping large bodies of literature. Unlike traditional systematic reviews that draw on literature pertaining to a specific question, scoping reviews synthesize and analyze topic and/or field related research to provide coherent insight into the conceptual state of research. See Table 2 for a brief overview of the similarities and differences between scoping reviews and traditional systematic reviews.

Table 2. Differences between Scoping Reviews and Systematic Reviews (Arksey & O'Malley, 2005)

Scoping Reviews	Systematic Reviews
The goal is to provide a descriptive overview of the reviewed material as a whole, not by individual studies	The goal is to synthesize research question specific evidence from reviewed studies
Includes material with a range of designs and methods	Heterogeneity in method and design is minimized for meaningful synthesis.

Scoping reviews map existing literature in terms of volume, nature, and characteristics of research. Scoping reviews are suited for topics that have not been extensively reviewed and are an appropriate method for initial explorations regarding the extent, range, and nature of research activity and allow scholars to identify gaps in the existing literature. Since our goal is to provide a descriptive overview of the presence/absence of implementation information in psychological intervention research, we required a systematic method that enabled a conceptual mapping of topic-related research material that is not bound by specific research questions, designs, or methods; scoping review is an ideal method for this kind of inquiry (Davis, Drey, & Gould, 2009).

Scoping Review Protocol and Preregistration

The protocol for conducting this scoping review was pre-registered as an open-ended registration with the Open Science Framework (OSF) on 22 December 2018 (https://osf.io/4cxp3). This article was drafted following the reporting guidelines presented in the Preferred Reporting Items for Systematic Reviews and Meta-analysis Protocols Extension for Scoping Reviews (PRISMA-ScR) (Tricco, et al., 2018).

Literature Search Strategy

The literature search was limited to the databases PsychInfo and ERIC. Gray literature and unpublished work were not included as this was not intended to be a comprehensive review. Instead, the goal was to take a small sample of recent intervention related publications in psychology, particularly five that are discussed widely in public discourse, and assess the level of implementation information they provide. We identified 105 relevant publications, i.e., 80 articles on PsychInfo and 25 on ERIC, of which, only 88[1] were unique items. See pre-registration stored in the OSF repository for the literature search strategy (https://osf.io/4cxp3).

Inclusion Criteria

Of the 88 unique publications, only the 56 that met the inclusion criteria made up the final dataset used for coding. We included only peer-reviewed English journal articles published between 2000-2018 that contained implementation information for any of the five intervention categories of interest. Articles that did not meet the above inclusion criteria were excluded from further review. See figure 1 for an overview of the literature search and the screening process.

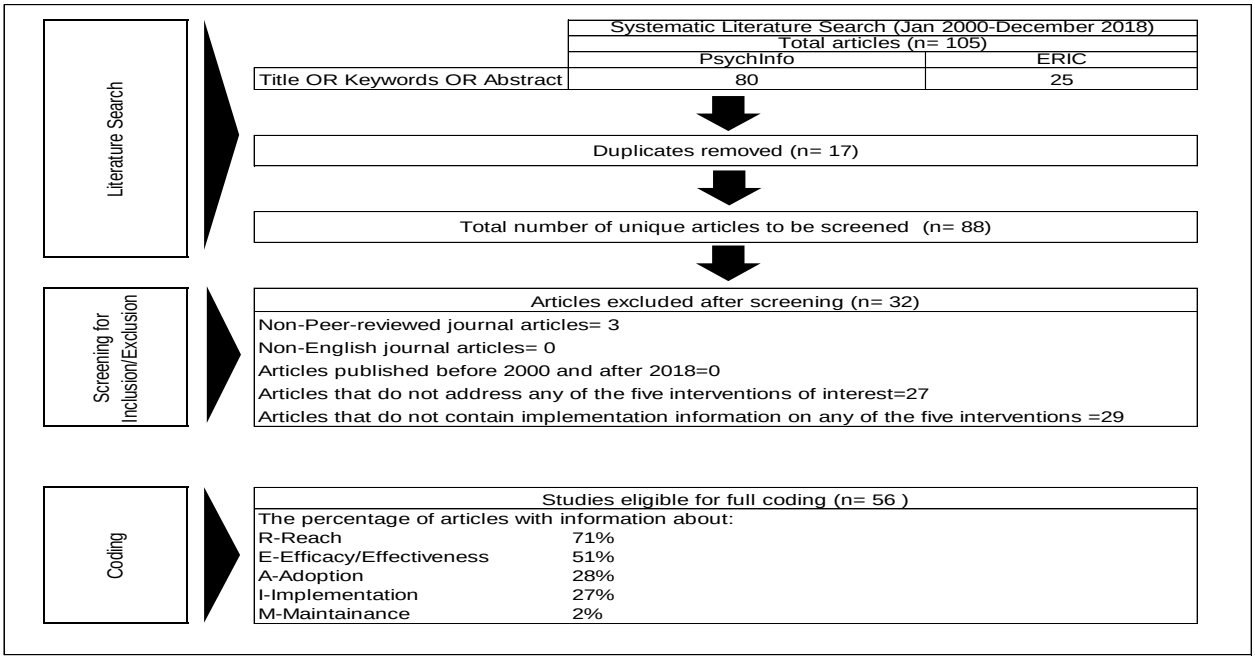

Figure 1. Overview of literature search and screening

[1] We pre-registered 89 unique articles but later discovered one extra duplicate article making the final count 88.

Adapting the RE-AIM Framework for Psychology

The creators of RE-AIM posit that all five evaluative components are very important, while acknowledging that some may be more important than others for different interventions and its contexts of application. Glasgow and colleagues (2019) encourage a more pragmatic use of key dimensions that are most relevant for the "particular question, setting, stakeholders, and stage of research" (p. 5) when the comprehensive application of all elements is not practical. Given that this framework was developed for another field (public health interventions), we adapted a RE-AIM checklist to code for variables that appear in psychology research that are equivalent to the RE-AIM components traditionally examined in public health.

Variables Coded

The coding variables chart in the OSF repository contains the detailed list and operational definitions of each variable, and to the extent that we can, 'exemplars' for the variables. In general, we coded variables associated with intervention *Reach* (3 variables), *Efficacy* (9 variables), *Adoption* (11 variables), *Implementation* (12 variables), and *Maintenance* (1 variable).

Coding Process

All articles that met the inclusion criteria were coded by multiple student coders to assess whether information provided in published papers and/or the supplemental materials associated with those papers contained information that is relevant to implementing the intervention. Because our goal is to provide an initial description of the state of the literature, coding was limited to assessing the mere presence (or absence) of implementation information for each of the variables on the checklist. We did not code the nature or quality of the implementation information (a point we revisit in the discussion). We employed a binary coding strategy where articles that provided any information relevant to implementation, irrespective of its quality, was coded as '1' to indicate presence of information. No implementation information related to the coding category, was coded as '0' to indicate absence of information. Discrepancies were discussed and resolved in weekly coding meetings that took place over two semesters (Spring and Summer 2019). To generate a summary score of how much implementation information was contained within each article (of all of the implementation categories we coded for), we simply summed up the counts to arrive at percentages that reflect the amount of implementation information that was presented. Percentages were calculated to capture both the presence of implementation information within each article as well as across all articles. When reading and interpreting the results which we report in percentages, readers should remember that these percentages reflect a proportion of the coded counts. See a detailed code sheet stored in the OSF repository for this project (https://osf.io/4yhgf/)

Results

The final dataset consisted of 56 peer-reviewed journal articles that collectively addressed five categories of psychological interventions: Belonging, Growth Mindset, Utility Value, Self-Affirmation, and Identity Based Motivation (IBM). Most of the papers were about Self-Affirmation (n=17) and Identity-based Motivation (n=16) interventions. Growth Mindset (n=8) and Utility Value (n=11) interventions were also fairly represented. However, there were only two papers on Belonging interventions. Further, two articles addressed more than one intervention and were categorized as 'Combined.' Across all the articles, the different types of interventions provided, on average, 36% of implementation information recommended by implementation scientists.

As described in the method section, we assessed each evaluation component of the RE-AIM framework using a checklist of questions adapted from the repository of measures and checklists found on re-aim.org (Measures & Checklists: Resources and Tools, 2020). This checklist consisted of specific indicators that mapped onto the different components. For example, the evaluation component 'Reach' was assessed using three questions: does the study (1) identify the sample; (2) describe the sample; (3) provide explicit exclusion criteria. These three questions collectively represented the evaluation component *Reach*. Papers that provided any information about *Reach*, irrespective of information quality, were included. Overall, most papers (71%) had information about *Reach* –who benefits from the intervention, and *Efficacy* (51%) – the impact of the intervention, closely followed by *Adoption* (28%), i.e., information about target settings and parties who would/should be interested in adopting the intervention, and *Implementation* (27%), i.e., information about implementation protocol, which includes time and financial investments. However, the papers had very little information about *Maintenance* (2%).

Figure 2 illustrates in greater detail, which pieces of implementation information were present in papers for each RE-AIM component.

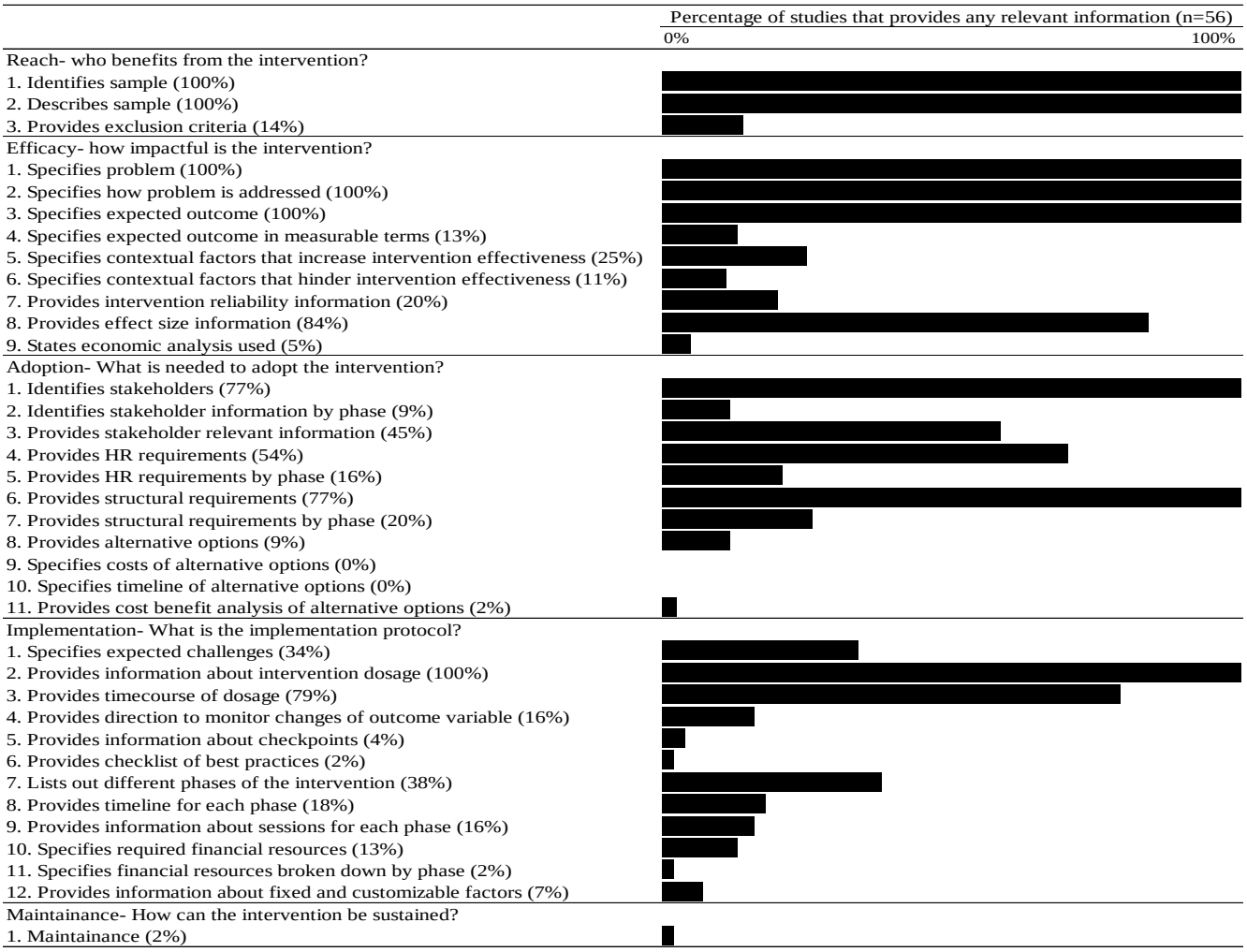

Figure 2. Presence of Implementation Information by RE-AIM component

As displayed in Figure 2, with respect to *Reach* information, all studies identified and described their sample, but only 14% explicitly provided exclusion criteria. This lack of information about exclusion criteria is concerning given the implications for establishing boundary conditions for theory (Simons et al., 2017), as well as the implications for knowing whether it is appropriate or inappropriate to apply the intervention to some groups but not others (Goroff et al., 2018). Regarding intervention *Efficacy*, all papers provided information about the problem being addressed, how the intervention addresses the problem, and the expected intervention outcome. While most (84%) provided information about the effect size a very few papers reported information about intervention reliability (20%). When assessing for moderating variables, which we termed "contextual factors," that fostered or hindered intervention effectiveness, only 25% provided information about factors that fostered and 11% specified factors that hindered effective outcomes. Further, only 5% provided information about economic factors required to assess the importance of the intervention; that is unfortunate as decision-makers often need that information to decide whether to implement one form of intervention over another. Note that even though our codebook included many economic factors such as opportunity costs, consumable costs, sensitivity analyses, costs incurred by those receiving the intervention (e.g. loss of working hours, travel time), we had to collapse these categories to 'economic factors' due to little to no reporting in the articles we coded.

In terms of intervention *Adoption*, while 77% of papers identify stakeholders, only 45% provide *information relevant to these stakeholders*. Ideally, stakeholder statements should identify key stakeholders from those with direct involvement (e.g. teachers) to those with a higher-level involvement such as policymakers (e.g. superintendent of schools, funding agencies). In addition to identifying these stakeholders, the quality of implementation information can be improved by providing comprehensive information about and for potential key stakeholders such as who are these stakeholders; what roles do they play in implementing the intervention and when; what do they need to know to ensure that the intervention can be implemented and maintained. 54% of the articles provide information about the human resource requirements required, and 77% provide information about material and structural resources needed. However, very few papers provided a break-down of this information by the different phases of the intervention.

For *Implementation* information, all papers provided dosage information, and 79% gave information about the time course for dosage (e.g., Bratter et al., 2016, administer a self-affirmation intervention which lasts for 15-20 minutes four times over a school year). Very few other pieces of information about implementation were provided.

Finally, only one study provided information about *Maintaining* the intervention, more specifically, identifying ways to document and share learning regarding the implementation process. See example quotes of the RE-AIM evaluation components and some of its specific indicators in Table 3 below.

Table 3. Example Quotes

Dimension	Example Quote	Indicators
Reach	"All participants were recruited from seven universities and community colleges in a Midwestern state. The age range of our sample was 18 through 62 (M 26.47, SD 8.77). Participants were pre-dominantly male (82.4%). The racial and ethnic make-up of our sample was White (86.5%), African American (6.8%), Hispanic/ Latino/a (5.4%), and multiracial (1.3%). Student veterans were first years (24.3%), sophomores (14.9%), juniors (16.2%), seniors (24.3%), and graduate students (20.3%). All participants identified as heterosexual" (Seidman, et al., 2018, p. 655)	Identifies sample Describes sample
	"Exclusion criteria included those who had medical conditions that contraindicate physical exercise." (Lee, Ashman, Shang, & Suzuki, 2014, p. 58)	Provides exclusion criteria
Efficacy		
	"if the growth mindset intervention reduces by 4 percentage points the proportion of 9th graders who earn D/F averages, then a fully scaled and spread version of this program could in theory prevent 100,000 high school dropouts in the U.S. per year—while increasing the learning-oriented behavior of many other students." (Yeager et al., 2016, p. 389)	Specifies expected outcomes in measurable terms
	"The utility-value intervention was successful in reducing the achievement gap for FG-URM students by 61%: the performance gap for FG-URM students, relative to continuing generation (CG)-Majority students, was large in the control condition, .84 grade points (d .98), and the treatment effect for FG-URM students was .51 grade points (d 0.55)" (Harackiewicz et al.,2015, p.1).	Specifies expected outcomes in measurable terms Provides effect size information
	"Such interventions are unlikely to be effective in contexts without opportunities for learning. Also, because the present intervention works by changing people's subjective interpretation of ambiguous events, it may be ineffective in openly hostile environments." (Walton & Cohen,2011, p. 1451)	Specifies contextual factors that hinder intervention effectiveness
	"This intervention works best for students who doubt their competence and for those with a history of poor performance." (Harackiewicz et al., 2015, p.3)	Specifies contextual factors that increase intervention effectiveness
Adoption	"With the approval of the district and the principals and deans of instruction at the individual schools, this exercise was integrated into their daily assignments in class and we were not obligated to gain informed consent from the students or their parents." (Bratter et al., 2016, p. 344).	Identifies stakeholders
Implementation	"Ninth-grade students (roughly aged 14) were given a series of four short writing exercises (lasting between 15 and 20 min) in their English classrooms during the 2012–2013 academic year." (Bratter et al., 2016, p. 344).	Provides information about intervention dosage Provides time course of dosage
	"In the first treatment group session, the students read aloud about how the brain learns using materials from https://www.mindsetworks.com/Science/" (Brougham & Kashubeck-West, 2017, p. 5).	Provides structural requirements

	"The class was conducted in a group room in the rehabilitation outpatient department" (Lee et al., 2014, p. 59).	
	"During the exercise phase, participants exercised twice per week, in a group format, guided by a trained and certified Inten-Sati instructor" (Lee et al., 2014, p.59).	Provides HR requirements
Maintenance	"We used our teacher feedback and examination of videotape to develop a web-based resource including preparation tips from teachers who delivered with fidelity, teacher viewable videotape of high fidelity delivery, and a video-assisted structured training module that teachers who already delivered Pathways can use to train other teachers." (Horowitz et al. 2018, p.27)	Maintenance i.e. how the intervention can be sustained

Interpreting the results

Even though there is considerable variance in the numbers between and within the five evaluation components of the RE-AIM framework, readers should keep in mind that the mere presence/mention of the indicator was counted as implementation information regardless of the quality. For example, when coding stakeholder information we considered studies that mentioned at least one stakeholder as providing implementation information. Ideally, papers should provide a stakeholder statement, with comprehensive information about and for potential key stakeholders. As another example, when coding for effect sizes, we looked for at least the presence of effect size units such as Cohen's d. Often it appears that the authors report the effect size numbers and leave it at that. This approach may be suitable for other academics, but not for other stakeholders. In addition to statistical reporting, authors need to translate the effect size number in the context of the intervention and its settings. For example, if an intervention is to improve grades for students, the magnitude of impact can be presented in a way that is relevant to the context at hand (e.g. improvement will be at least a half point increase in GPA on a 4.0 scale).

Discussion

One of psychology's latent values that has manifested frequently over the decades is the value of sharing our research with the broader world—to ensure that our work can contribute to addressing pressing issues in society (Ellsworth, 1991; Gruber et al., 2019; Lewin, 1946; Teachman et al., 2015). Within the field, this value is particularly important among intervention scientists who spend much of their working lives conducting the very studies that ought to be able to speak directly to problems of the day (Suarez-Balcazar et al., 1992). Given this value and the number of people conducting research to translate that value into action, we wondered how ready intervention science research within psychology was for implementation. Thus, we reviewed some of psychology's most well-known interventions to get a preliminary answer.

Of the psychological intervention papers we reviewed, the paper that provided the most implementation information contained information for 64% of the implementation categories coded. We suspect, given the generous (presence/absence) coding strategy we adopted, that the estimates reported in this paper may be overestimates of the implementation information reported in psychological intervention papers (and supplemental materials of those papers); a more stringent analytic approach may have yielded different results (e.g., floor effects).

Implications for Theory

On the surface, the questions about implementation readiness asked in this paper might seem like purely "applied" questions that would be of little interest to psychologists trying to advance "basic" theories. However, these seemingly applied questions are, in fact, deeply theoretical

(Lewis, 2019; 2020). One of social psychologist Kurt Lewin's most famous quotes is, "if you want truly to understand something, try to change it." At its essence, that is what intervention research in psychology tries to do. By studying questions about how to successfully develop, disseminate, implement, and scale interventions, the field gains more precise theories about the complex interactions between people and their situations (Earl & Lewis, 2019; Goroff et al., 2018; Rothman, 2004).

Examining the implementation information reported in our field's intervention articles has the potential to teach us about how differences in contexts influence our ability to detect (and replicate) psychological phenomenon (Klein, et al., 2018), whether there is heterogeneity in psychological processes between and within populations (Simons et al., 2017; Whitsett & Shoda, 2014), whether and how features of the time periods in which a study was conducted matter for the mental representations that come to people's minds (Lewis & Michalak, 2019), whether the sources we use in our studies and the ways they communicate matter for people's metacognitive experiences (Schwarz, 1994), and the downstream consequences of those experiences for their motivation (Oyserman, 2015). Studying these processes brings us closer to understanding how complex dynamics guide human behavior (Goroff et al., 2018; Hovland, Janis, & Kelley, 1953).

Implications for Practice

From a practical perspective, intervention research is driven by the assumption that once tested for effectiveness, interventions will be disseminated and implemented in a variety of relevant settings (Institute of Medicine (US) Committee on Health and Behavior, 2001). That assumption is misguided. For intervention research to be useful, implementors need information about critical factors that allow them to determine whether and how to implement the intervention. So though it is wonderful for psychologists to develop and test interventions and publish them in our peer-reviewed journals, if we do not share the information that is required by implementors, the immense potential our work has for fostering change will not be realized (Lewis & Wai, in press).

Incentivizing Implementation Reporting

There seems to be misalignment between the work that psychologist put in to develop and test interventions and the potential for those interventions to have broader impacts in the world. As such, it might be worthwhile to consider ways of systematically aligning the way we do intervention work with the goal of practical impact right from the very beginning (Stenhouse, 2017). If psychologists were to incorporate designing for implementation/dissemination much earlier in the research pipeline, the possibility for our ideas to have practical relevance would be much greater (Horowitz et al., 2018; Yeager et al., 2016). While we do not yet have a comprehensive set of solutions for how to achieve this goal, one strategy that is worthy of consideration as a starting point is to potentially modify reporting guidelines to incentivize researchers to consider implementation at the beginning of their intervention research process. Given that peer-reviewed articles are mainly targeted for other researchers, the articles we reviewed succeed in addressing the needs of its primary audience (other academics), but have not addressed the needs of other intended audiences of intervention research: intervention practitioners. Even though peer-reviewed articles are not targeted to practitioners and policymakers, these articles are often the primary source of information regarding interventions of interest. To bridge the communication gap between researchers, practitioners, and other decision-making stakeholders, editorial boards of

academic outlets, especially those publishing social change related research, can help by recommending implementation related reporting guidelines.

Limitations and Constraints on Generality

The current research has some important limitations that need to be kept in mind when interpreting the results of this paper. We have made many of these points earlier in the article, but we want to reiterate them due to their theoretical and practical importance. The data presented in this paper are from a scoping, not a large-scale systematic review or meta-analysis. When interpreting results, we ask readers to remember that this is not a comparative exercise to assess which sub-disciplines or interventions within psychology are doing better or worse, but is rather a conceptual mapping of the state of implementation information in the field at the current moment in time. We acknowledge that our analysis is based on a framework that was initially developed in another field (public health); reasonable readers may question whether it is fair to hold psychologists to the standards of another field. That is a discussion we should have as a field: what standards should we hold ourselves to, and what frameworks are the most relevant frameworks for psychologists wanting to intervene in the world (see also IJzerman et al., 2020)? At present, psychologists are not expected to report on RE-AIM indicators or other indicators for implementation, despite the amount of intervention research that we do in our field. However, in the interest of starting somewhere, we chose to use an already existing evidence-based framework as a starting point to shed light on areas that need attention. The creators of RE-AIM posit that all five evaluative components are very important, while acknowledging that some may be more important than others for different interventions and its contexts of application. Glasgow et al.(2019) recommend that the relative importance of the dimensions should be established a-priori with all the stakeholders in the planning stages and encourage a more pragmatic use of key dimensions that are most relevant for the "particular question, setting, stakeholders, and stage of research" (p. 5) when the comprehensive application of all elements is not practical. It might be worthwhile for psychologists to consider collectively coming up with an implementation checklist that is tailored to psychology.

We assessed only peer-reviewed journal articles, which in itself may not be the ideal way to communicate with practitioners and policymakers (Posavak, 1992). However, given that most academic research is published in peer-reviewed journals, starting off with peer-reviewed articles seemed reasonable.

It is also important to remember the role of researcher decisions when interpreting the results. We chose to adopt a binary coding strategy (presence or absence of information) rather than a deeper-diving assessment of the quality of implementation information, then we aggregated those binary counts to create overall indicators. Alternative operationalizations may lead to different conclusions; one of our motivations for sharing our dataset is to encourage others to consider alternative approaches and what they might mean for broader conclusions (Forscher, 1963; LeBel, McCarthy, Earp, Elson, & Vanpaemel, 2018). Most indicators we used for coding are better suited for interventions that have been extensively tested and are ready for dissemination and implementation. While our chosen time frame (i.e. 2000-2018) was meant to increase the chances of obtaining implementation-ready intervention reporting, the literature search strategy employed for this scoping review mainly identified articles with intervention research in the very initial stages, for example, laboratory-based experiments testing for effects. Readers should keep this in mind when interpreting the results. On a related note, the lack of later stage intervention research may have at least two possible explanations: (1) intervention research rarely moves beyond experiments in laboratory or other heavily controlled settings, and/or (2) implementation information is being communicated in other (i.e., non-academic) outlets.

Further, we reviewed only peer-reviewed journal articles, from a limited time window (2000-2018) for five categories of psychological interventions, interventions that disproportionately draw from the developmental, educational, social, and personality psychology literature. Our claims should be interpreted with those caveats in mind—it is plausible, and even probable, that they do not generalize to all areas of psychology (though see Sakaluk, Williams, & Kilshaw, 2019) for related concerns in clinical psychology). Moreover, we evaluated implementation readiness through the lens of one implementation science framework—RE-AIM; conclusions may differ if the papers were to be coded with a different implementation science lens – we encourage others to use our open dataset and test this possibility.

Final Note

The American Psychological Association, Association for Psychological Science, Society for Personality and Social Psychology, and likely other professional psychological organizations have all recently encouraged psychologists to expand our impact by studying complex issues facing the field and broader society. We personally endorse these calls and believe the best psychological research is that which simultaneously advances theory and is beneficial for practice (see also Berkman, 2017; Lewis & Wai, in press). To quote Stenhouse (2017): "the problem of achieving widespread real-world effectiveness is too important, and too interesting, to leave it to ad-hoc, non-scientific study by practitioners alone. There should be debate about exactly how to address this problem, whether RE-AIM is the ideal framework to address it, and how much resources should be devoted to it. There should not be debate about whether this research needs to be done at all." Harnessing that collective desire for broader impact, however, and readying the field to truly 'give psychology away' requires paying more attention to, and reporting on, the factors that our intended recipients need to take what we have to give.

Declaration of Conflicting Interests

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References

Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International journal of social research methodology, 8*(1), 19-32.

Aronson, J., Fried, C. B., & Good, C. (2002). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of experimental social psychology, 38*(2), 113-125.

Baumeister, R. F., Vohs, K. D., & Funder, D. C. (2007). Psychology as the science of self-reports and finger movements: Whatever happened to actual behavior? *Perspectives on Psychological Science, 2*(4), 396-403.

Berkman, E. T. (2017, September 8). *Advice for Grad Students (and Senior Faculty): How to escape the hamster wheel of academic psychology*. From Psychology Today: Retrieved from: https://www.psychologytoday.com/us/blog/the-motivated-brain/201709/advice-grad-stu

Bratter, J. L., Rowley, K. J., & Chukhray, I. (2016). Does a self-affirmation intervention reduce stereotype threat in black and Hispanic high schools? *Race and Social Problems, 8*(4), 340-356. doi:https://doi.org/10.1007/s12552-016-9187-4

Broda, M., Yun, J., Schneider, B., Yeager, D. S., Walton, G. M., & Diemer, M. (2018). Reducing inequality in academic success for incoming college students: A randomized trial of growth mindset and belonging interventions. *Journal of Research on Educational Effectiveness*, 317-338. doi:https://doi.org/10.1080/19345747.2018.1429037

Brougham, L., & Kashubeck-West, S. (2017). Impact of a growth mindset intervention on academic performance of students at two urban high schools. *Professional School Counseling, 21*(1), pp. 1-9. doi:https://doi.org/10.1177/2156759X18764934

Cohen, G. L., Garcia, J., Apfel, N., & Master, A. (2006). Reducing the racial achievement gap: A social-psychological intervention. *Science, 313*(5791), 1307-1310. doi:DOI: 10.1126/science.1128317

Cummings, E. (2019, March 21). SRCD 2019 Invited Program. *Relevant Day*. From https://www.srcd.org/srcd19/invited-program

Davis, K., Drey, N., & Gould, D. (2009). What are scoping studies? A review of the nursing literature. *International journal of nursing studies, 46*(10), 1386-1400.

DeAngelis, T. (2010, November). Getting reseach into the real world. *Monitor on Psychology,, 41*(10), p. 60.

Earl, A., & Lewis, N. A., Jr. (2019). Health in context: New perspectives on healthy thinking and healthy living. *Journal of Experimental Social Psychology, 81*(3), 1-4.

Ellsworth, C. P. (1991). To Tell What We Know or Wait for Godot? *15*(1), 77.

Forscher. (1963, October 18). Chaos in the Brickyard. *142*(3590), 339. doi:10.1126/science.142.3590.339

Forscher, P. S., Vazire, S., & Anvari, F. (2020, May 19). To create social good, psychology needs credible evidence. From https://featuredcontent.psychonomic.org/to-create-social-good-psychology-needs-credible-evidence/

Gaglio, B., Shoup, J. A., & Glasgow, R. E. (2013). The RE-AIM framework: A systematic review of use over time. *American Journal of Public Health, 103*(6), e38–e46. doi:https://doi-org.proxy.library.cornell.edu/10.2105/AJPH.2013.301299

Glasgow, R. E., Harden, S. M., Gaglio, B., Rabin, B., Smith, M. L., Porter, G. C., . . . Estabrooks, P. A. (2019). RE-AIM planning and evaluation framework: adapting to new science and practice with a 20-year review. *Frontiers in Public Health*. doi: https://doi.org/10.3389/fpubh.2019.00064

Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the public health impact of health promotion interventions: The RE-AIM framework. *American Journal of Public Health, 89*(9), 1322-1327. doi:https://doi.org/10.2105/AJPH.89.9.1322

Goroff, D., Lewis, N. A., Jr., Scheel, A. M., Scherer, L., & Tucker, J. A. (2018). The inference engine: A grand challenge to address the context sensitivity problem in social science research. doi:https://doi.org/10.31234/osf.io/j8b9a

Gruber, J., Saxbe, D., Bushman, B. J., Mcnamara, T., & Rhodes, M. (2019). How can psychological science contribute to a healthier, happier, and more sustainable world? *Perspectives on Psychological Science, 14*(1), 3-6. doi:https://doi.org/10.1177/1745691618821624

Harackiewicz, J. M., Canning, E. A., Tibbetts, Y., Priniski, S. J., & Hyde, J. S. (2015, November 2). Closing achievement gaps with a utility-value intervention: Disentangling race and social Class. *Journal of Personality and Social Psychology. Advance online publication*. doi:http://dx.doi.org/10.1037/pspp0000075

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and brain sciences, 33*(2-3), 61-83.

Horowitz, E., Sorensen, N., Yoder, N., & Oyserman, D. (2018). Teachers can do it: Scalable identity-based motivation intervention in the classroom. *Contemporary Educational Psychology, 54*, pp. 12-28. doi:https://doi.org/10.1016/j.cedpsych.2018.04.004

Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion.* Yale University Press.

Hulleman, C. S., & Harackiewicz, J. M. (2009). Promoting interest and performance in high school science classes. *Science, 326*(5958), 1410-1412.

IJzerman, H., Lewis, N. A., Jr., Weinstein, N., DeBruine, L. M., Ritchie, S. J., Vazire, S., & … Przybylski, A. K. (2020, April 27). Is social and behavioural science evidence ready for application and dissemination? doi:https://doi.org/10.31234/osf.io/whds4

Institute of Medicine (US) Committee on Health and Behavior: Research, P. a. (2001). Evaluating and disseminating intervention research. In *Health and Behavior: The Interplay of Biological, Behavioral, and Societal Influences* (pp. 274-327). Washington DC: National Academies Press (US). From https://www.ncbi.nlm.nih.gov/books/NBK43743/pdf/Bookshelf_NBK43743.pdf

Klein, R. A., Vianello, M., Hasselman, F., Adams, B. G., Adams Jr, R. B., Alper, S., & Batra, R. (2018). Many Labs 2: Investigating variation in replicability across samples and settings. *Advances in Methods and Practices in Psychological Science, 1*(4), 443-490. doi:https://doi.org/10.1177/2515245918810225

LeBel, E. P., McCarthy, R. J., Earp, B. D., Elson, M., & Vanpaemel, W. (2018). A unified framework to quantify the credibility of scientific findings. *Advances in Methods and Practices in Psychological Science, 1*(3), 389-402. doi:https://doi.org/10.1177/2515245918787489

Lee, Y. S., Ashman, T., Shang, A., & Suzuki, W. (2014). Brief report: Effects of exercise and self-affirmation intervention after traumatic brain injury. *NeuroRehabilitation, 35*(1), pp. 57-65.

Lewin, K. (1946). Action research and minority problems. *Journal of social issues, 2*(4), 34-46.

Lewis, N. A., Jr. (2019). Studying people in their local environments: Using a mobile research lab to study person-by-situation interactions. *Observer, 32*(3), 29-30.

Lewis, N. A., Jr. (2020). Open communication science: A primer on why and some recommendations for how. *Communication Methods and Measures*, 14(2), 71-82.

Lewis, N. A., Jr. ,& Wai, J. (in press). Communicating what we know, and what isn't so: Science communication in psychology. *Perspectives on Psychological Science*.

Lewis, N. A., Jr., & Michalak, N. (2019). Has stereotype threat dissipated over time? A cross-temporal meta-analysis. From https://psyarxiv.com/w4ta2/download?format=pdf

Measures & Checklists: Resources and Tools. (2020). From RE-AIM.org: http://www.re-aim.org/resources-and-tools/measures-and-checklists/

Miller, G. A. (1969). Psychology as a means of promoting human welfare. *American Psychologist, 24*(12), 1063-1075.

Oyserman, D. (2015). *Pathways to success through identity-based motivation.* New York: Oxford University Press. doi:https://doi.org/10.1002/9781118900772.etrds0171

Posavak, E. (1992). Communicating Applied Social Psychology to Users. In F. Bryant, J. Edwards, R. Tindale, E. Posavac, L. Heath, E. Henderson-King, & Y. Suarez-Balcazar (Eds.), *Methodological Issues in Applied Social Psychology* (Vol. 2, pp. 269-294). Boston, Massachusetts, United States of America: Springer.

Rothman, A. J. (2004). "Is there nothing more practical than a good theory?": Why innovations and advances in health behavior change will arise if interventions are used to test and refine theory. *International Journal of Behavioral Nutrition and Physical Activity , 1*(11). doi:https://doi.org/10.1186/1479-5868-1-11

Rozin, P. (2009). What kind of empirical research should we publish, fund, and reward?: A different perspective. *Perspectives on Psychological Science, 4*(4), 435-439. doi:https://doi-org.proxy.library.cornell.edu/10.1111/j.1745-6924.2009.01151.x

Sakaluk, J. K., Williams, A. J., & Kilshaw, R. E. (2019). Evaluating the evidential value of empirically supported psychological treatments (ESTs): A meta-scientific review. *Journal of Abnormal Psychology, 128*(6), 500-509. doi:http://dx.doi.org.proxy.library.cornell.edu/10.1037/abn0000421

Schwartz, B. (2012, November 12). Move over economists: We need a Council of Psychological Advisers. *The Atlantic*. From http://www.theatlantic.com.proxy.library.cornell.edu/politics/archive/2012/11/move-over-economists-we-need-a-council-of-psychological-advisers/265085/

Schwarz, N. (1994). Judgment in a social context: Biases, shortcomings, and the logic of conversation. *Advances in Experimental Social Psychology, 26*, 123-162.

Sears, D. O. (1986). College sophomores in the laboratory: Influences of a narrow data base on social psychology's view of human nature. *Journal of Personality and Social Psychology, 51*(3), 515-530. doi:https://doi.org/10.1037/0022-3514.51.3.515

Seidman, A. J., Wade, N. G., Lannin, D. G., Heath, P. J., Brenner, R. E., & Vogel, D. L. (2018). (2018). Self-affirming values to increase student veterans' intentions to seek counseling. *Journal of Counseling Psychology, 65*(5), 653-660. doi:http://dx.doi.org/10.1037/cou0000289

Simons, D. J., Shoda, Y., & Lindsay, D. S. (2017). Constraints on generality (COG): A proposed addition to all empirical papers. *Perspectives on Psychological Science, 12*(6), 1123-1128.

Stenhouse, N. (2017). Spreading success beyond the laboratory: applying the RE-AIM framework for effective environmental communication interventions at scale. *Environmental Communication, 11*(6), 756-768.

Suarez-Balcazar, Y., Balcazar, F. E., & Fawcett, S. B. (1992, Springer, Boston, MA.). Problem identification in social intervention research. In F. B. Bryant, J. Edwards, R. S. Tindale, E. J. Posavac, L. Heath, & E. Henderson-King (Eds.), *Methodological Issues in Applied Social Psychology* (Vol. 2, pp. 25-42). Boston, MA: Springer. doi:https://doi.org/10.1007/978-1-4899-2308-0_2

Sunstein, C. R. (2015). On interesting policymakers. *Perspectives on Psychological Science*, 10(6), 764-767.

Sunstein, C. R. (2016). The council of psychological advisers. *Annual Review of Psychology, 67*, 713-737

Teachman, B. A., Norton, M. I., & Spellman, B. A. (2015). Memos to the president from a "Council of Psychological Science Advisers. *Perspectives on Psychological Science, 10*(6), 697-700.

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., & Hempel, S. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine, 169*(7), 467–473. doi:doi: https://doi.org/10.7326/M18-0850

Walton, G. M., & Cohen, G. L. (2011). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science, 331*(6023), 1447-1451. doi:DOI: 10.1126/science.1198364

Whitsett, D. D., & Shoda, Y. (2014). An approach to test for individual differences in the effects of situations without using moderator variables. *Journal of Experimental Social Psychology*, 94-104. doi:https://doi.org/10.1016/j.jesp.2013.08.008

Yeager, D. S., Romero, C., Paunesku, D., Hullerman, C. S., Schneider, B., Hinojosa, C., . . . Dweck, C. S. (2016). Using design thinking to improve psychological interventions: The case of the growth mindset during the transition to high school. *Journal of Educational Psychology, 108*(3), 374-391.

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