Counting What Counts: When and How Performance Indicators Mislead

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

People often rely on performance indicators for feedback on broad personal and organizational goals, e.g., using body weight to assess health and, in academia, using publication count to assess scientific contribution. Indicators can also be helpful as specific goal targets themselves, e.g., lose ten pounds, publish three papers (Locke & Latham, 2002). Yet, indicators rarely capture broad underlying goals, like health or scientific contribution, in full. As a result, people can also pursue indicators in ways that actually hinder underlying goals (Ordóñez, Schweitzer, Galinsky, & Bazerman, 2009)—what I conceptualize as "misalignment" from the underlying goal. For example, narrowly pursuing publication count can ironically lead to questionable research practices that are misaligned with the underlying goals of science. I review the existing research related to this phenomenon, primarily from management science, and present an integrative model suggesting potential antecedents and psychological consequences. Building on social psychological research, I then develop and test two main hypotheses: 1) the perceived social value of performance indicators is a key predictor of misalignment and 2) when misaligned, people feel reduced authenticity and well-being. The results of five studies—across six performance indicators—were generally consistent with the hypothesized antecedents (Studies 1, 2, and 5) and consequences (Studies 3-5). I discuss implications for understanding the motivation behind misalignment, limitations of the present research, and promising avenues for intervention.

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Introduction

During the Vietnam War, U.S. forces used what seemed a straightforward measure of success: the number of enemy combatants killed. Indeed, body counts became a primary indicator by which commanders were evaluated, which may have helped in recognizing merit and motivating strategic performance. This focus on body counts, however, also led to now-notorious distortions (Darley, 1994; Perrin, 1998; Remson, 1981)—such as fighting among officers over who could claim dead bodies and widespread over-reporting of kills. Much more disturbingly, U.S. forces massacred thousands of unarmed Vietnamese civilians and counted these as enemy combatants. Although other factors certainly contributed to these abuses as well, this intersection of war and modern management techniques remains a powerful reminder that to define and measure performance is not merely the dry, reflective task that we may imagine it to be; it often actively drives our behavior in dramatic and unintended ways.

Similar examples abound. In many police departments, performance is measured by the proportion of crimes solved or "clearance rates"—leading to the neglect of difficult cases, widespread failures to record complaints, and even pressuring prisoners to falsely confess to unsolved crimes (Campbell, 1976). In many schools, performance is measured by students' improvement in standardized test scores—leading to curriculum-narrowing or "teaching to the test," as well as systemic misrepresenting of scores (e.g., Bohte & Meier, 2000; Ryan & Weinstein, 2009). Unintended consequences, though less extreme, can occur even in regulating our own goals as individuals. When people can access measures of personal output (e.g., steps, pages read), they frequently choose to evaluate their success with those indicators, without realizing that tracking can lead to less enjoyment of the measured activity, neglect of the activity when no longer measured, and in some cases, lower quality outcomes (e.g., Etkin, 2016).

Nonetheless, measurement, and evaluation more broadly, is indispensable—an integral part of both individual self-regulation and the management of an organization (Carver & Scheier, 1982; Kuske & Zander, 2005). Measurement facilitates decision-making and provides people with tractable feedback to improve on their broadest and most valued goals (Bandura, 1991; Vallacher & Wegner, 1987; Warner & Havens, 1968). It is not surprising, then, that we are constantly developing and implementing new measurement tools—capitalizing in particular on new tools for quantitative measurement made possible with the rise of information technology (e.g., Espeland & Sauder, 2007; Neely, 1999; Smith, 2007). Rather than relying on an intuitive and potentially biased sense of whether we have healthy habits, we can track our number of calories, grams of saturated fat, and precise number of steps. Rather than relying on a general sense or hearsay as to which universities have the best quality programs, we can go online and look up the school rankings.

In management as well, although measurement has always been a major focus (Kuske & Zander, 2005), there is a continued trend toward greater emphasis on quantitative performance measures (Espeland & Sauder, 2007; Neely, 1999; Perrin, 1998; Ridgway, 1956)—which has been attributed in recent years to the movement for accountability (e.g., Mannion & Braithwaite, 2012) and to public reform measures like New Public Management (Osterloh, 2010; Perrin, 1998; Van Thiel & Leeuw, 2002). Now more than ever organizations and the individuals within them must demonstrate their value and deliver the numbers.

Given the prevalence and real value of quantitative indicators, but also the unintended consequences they regularly create, it is important to gain a clearer understanding of when and how performance measurement goes awry. In particular, like the examples above, I will focus in my dissertation on the phenomenon of "misalignment," in which an indicator is pursued at the

expense of the underlying goal it is intended to measure. When teachers narrowly "teach to the test," for example, they are misaligned from the underlying goal of quality teaching—indeed, the very goal to which standardized tests are intended to keep teachers accountable. I define "underlying goal" as a broad culturally-valued end such as edifying students, keeping the community safe, or contributing to science; and "indicator" as any measure used to assess the progress made towards an underlying goal, with a focus here on quantitative measures, such as test scores, police clearance rates, and publication or citation counts.

Many areas of research speak to the trade-offs of using performance indicators. However, this existing research is largely siloed. Psychological research, for example, has primarily focused on the benefits of indicators—in particular, on how intentionally setting indicator-based goals can aid goal pursuit (e.g., Locke & Latham, 2002). This research does not systematically address how discrepancies between the indicator goal and the underlying goal can lead to unintended consequences (e.g., Ordóñez, Schweitzer, Galinsky, & Bazerman, 2009). Moreover, even the research on the drawbacks of indicator goals does not typically integrate the observation that misalignment can occur even without explicit goal-setting. Indeed, it has long been documented in management science research that using a performance indicator merely for assessment is sufficient for misalignment to occur (e.g., Merton, 1940; Warner & Havens, 1968). To reference my opening example, even though generals in the Vietnam War did not explicitly set target body counts, it was sufficient that commanders knew they were evaluated by this metric for it to become a narrow focus of motivation and undermine underlying goals.

In my dissertation, I outline a model to help integrate these related lines of research on the trade-offs of using performance indicators and, in particular, to organize what they each contribute to our current understanding of the antecedents to misalignment—i.e., when and how

indicators help and when and how they backfire for the underlying goal. This model draws predominantly on management science research, where, as noted above, the unintended consequences of indicators have been studied most directly. In turn, I propose that a social psychological perspective can contribute important yet untapped insights, both into the antecedents to misalignment and into the previously untested question of its psychological consequences. With regards to the antecedents, given the need to gain approval and acceptance from others (e.g., Baumeister & Leary, 1995), I develop and test the hypothesis that a key predictor of misalignment is the degree to which individuals perceive the indicator itself as socially valued. With regards to the consequences, I develop and test the hypothesis that when experiencing misalignment, people will feel reduced authenticity and well-being.

Benefits of pursuing indicators: you get what you measure

To understand misalignment, it is helpful to first understand why performance indicators are often intentionally pursued as goals. Indeed, a key benefit of indicators, both for organizations and individuals, is that they can provide a clear, tangible focus for goals, e.g., get straight-A's, lose ten pounds, improve customer service evaluations by 5%, reach a top-ten ranking among similar organizations. In support of this claim, goal setting theorists find across hundreds of studies—including both personal and organizational contexts—that setting specific, challenging goals promotes greater goal attainment compared to no goals or "do-your-best" goals (with effect sizes ranging from r of .42 to .80; see Latham, Ganegoda, & Locke, 2011; Locke & Latham, 2002; Locke & Latham, 1990). In other words, without a concrete indicator or, in their terms, "external referent," even those with ambitious intentions under-perform: The student who sets the goal to get straight-As next term is likely to end up with better grades than the student who has only a general intention to do well in school but no specific goal.

In a similar vein, control theory (Carver & Scheier, 1982) and other cybernetic models (e.g., Lord & Hanges, 1987; Miller, Galanter, & Pribram 1960) posit that monitoring one's performance in comparison to a desired reference point or goal is a central process of effective self-regulation. Indeed, across over a hundred studies, goal progress-monitoring interventions have a moderately-large positive effect on goal attainment (d = 0.40 for a meta-analysis, see Harkin et al., 2016). Additionally, when this progress is reported or made public, as is indeed the case for many performance indicators, the effects of goal-monitoring are even stronger. In other words, beyond setting a specific indicator-goal, regularly and publicly tracking that indicator also improves performance. Continuing with the above example, the student who regularly checks her grades is likely to get better grades, especially if others will find out her grades too.

Drawbacks of pursuing indicators: you get what you measure

Setting specific indicator-based goals and regularly monitoring those indicators are both clearly beneficial for indicator progress itself; however, the question becomes whether the indicator accurately reflects the end outcome one seeks. Unfortunately, getting better grades doesn't always mean truly learning or achieving more—and the same goes for many indicators. In certain cases, an indicator may perfectly capture the underlying goal, e.g., lower race times perfectly reflecting a coach's goal of training faster athletes. Often, however, the underlying goals we care about are complex and multi-faceted, rendering even the best-devised indicators imperfect (Bandura, 1991). Crucially, even small imperfections in an indicator imply that there are: 1) ways to promote the underlying goal that are unmeasured, i.e., do not improve the indicator and 2) ways to improve the indicator that are non-substantive, i.e., do not promote the underlying goal.

If an indicator is a focal goal of its own, then its imperfections become problematic for the underlying goal. Specifically, I propose that a narrow focus on indicators can lead to two related motivational shifts, what I will refer to as passive and active misalignment (see also Kelman & Friedman, 2009). For one, people become more likely to neglect unmeasured means to the underlying goal. This "passive misalignment" is exemplified when a student regularly neglects study material that isn't explicitly on the test. In addition, people become more likely to pursue non-substantive means to the indicator. This "active misalignment" is exemplified when a student gets answers or cheats on assignments at the expense of fully understanding or retaining class concepts. Importantly, any degree of misalignment represents a systematic and suboptimal outcome from the perspective of the underlying goal; in more extreme cases, though, this could even outweigh the benefits of using indicators altogether.

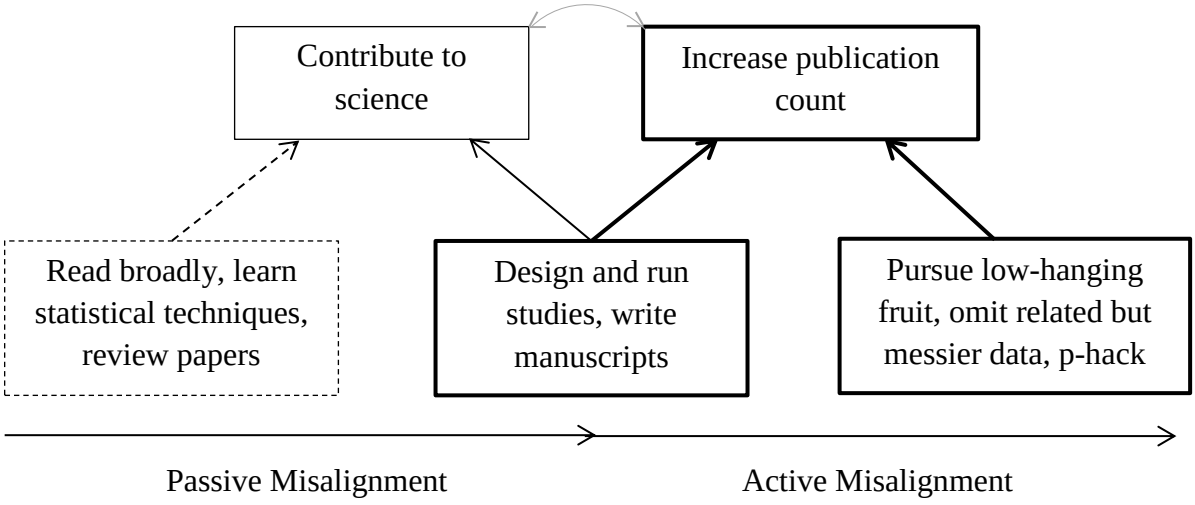
To flesh this out in more detail, consider again the example of contributing to science, which is often assessed using the indicator of publication count, among others. As with many indicators, publication count is imperfect: It captures some aspects of contributing to science better than others. Reading broadly, for example, may ultimately help in guiding research questions and making stronger arguments, thus potentially leading to more publications—but its relationship to publication count is less direct, certain, and immediate compared to that of running one's own studies and writing manuscripts. If people are perfectly aligned with the goal of contributing to science, though, this slight limitation of publication count as a measure is trivial. Indeed, when perfectly aligned, publication count is a mere byproduct of one's best efforts to contribute to science, pursued only to the extent that it contributes to science.

What is much more consequential, as discussed above, is when this imperfect indicator becomes a valued goal in and of itself, as opposed to only an assessment of scientific

contribution (as depicted in Figure 1). If publication count is its own valued goal, then individuals are more likely to prioritize those means to scientific contribution that more directly produce publications. Moreover, given limited time or resources, this prioritization may mean a passive shift away from pursuing valuable means to scientific contribution that less directly produce publications, e.g., forgoing broad reading or additional statistical training. Similarly, it may also mean an active shift toward pursuing means to efficiently maximize publications that are less desirable for science, e.g., questionable research practices. Thus, even with a relatively high-validity indicator (or at least initially so), the motivation to pursue an indicator in and of itself can pull individuals out of alignment with the underlying goal.

Figure 1

From Imperfect Indicator to Misalignment



The very feature of indicators that gives them strength then is also an important weakness. Although indicators help people focus and improve by the defined metric, they may not necessarily focus people on what is best for the underlying goal. As aptly described by Osterloh (2010) and others, we can end up "hitting the target but missing the point."

Importantly as well, this example highlights how misalignment can occur quite subtly. Many everyday scientific activities can actually be seen as a means both to contributing to science and to increasing one's publication count—just some a more direct means to one goal than the other. Given this ambiguity, whether one is over-prioritizing the indicator may be genuinely difficult to know. In addition, even for those actions which more clearly exemplify misalignment (e.g., not being transparent that a finding was exploratory), individuals may often feel validated by existing norms and fail to fully acknowledge the practical or ethical implications of indicator pursuit (e.g., Barsky, 2008). Thus, I propose that even those who maintain a deep commitment and intention to prioritize the underlying goal may nonetheless at times become misaligned. In certain situations, much like driving with misaligned wheels, we may veer the wrong direction and need to intervene to get back on track.

Existing evidence of indicator pursuit causing misalignment. There are hints of these unintended consequences in the psychological literature, both in the research on goal-setting and goal progress-monitoring (most notably, a critical review on goal-setting theory by Ordóñez, Schweitzer, Galinsky, & Bazerman, 2009). In particular, several experiments speak to the passive component of misalignment—that the pursuit of indicators can lead to neglecting important but non-focal aspects of the underlying goal. Two studies on task-revision, for example, showed that highlighting a goal of fixing as many grammatical errors as possible (vs. not) led participants to neglect flagrant content errors or misinformation, even when the underlying goal was clearly to improve the writing overall (Staw & Boettger, 1990). Another study showed that people who completed a task with a challenging indicator-based goal (vs. a do-your-best goal) became less willing to help coworkers (Wright, George, Farnsworth, & McMahan, 1993). As well, in a difficult stock evaluation task with multiple goals, participants

sacrificed a less easily-measured aspect of performance (quality) in favor of maximizing the number of portfolios processed (Gilliland & Landis, 1992). Thus—particularly under demanding circumstances—focusing on indicators can lead less-easily-measured aspects of performance like quality and collaboration to fall between the cracks.

Studies in educational contexts show similar effects (see Ryan & Weinstein, 2009). Grolnick & Ryan (1987), for example, found that children who read a text expecting to be graded (vs. not) initially exhibited better rote recall. However, they exhibited worse conceptual learning as assessed by open-ended response and greater deterioration of rote recall when tested the following week. A narrow focus on test scores can lead to misalignment for teachers as well (Deci et al., 1982; Flink et al., 1990). Specifically, teachers given the test-based goal to "perform up to standards" (vs. not) engaged in more controlling instructional behaviors like lecturing and neglected more sensitive participatory styles of teaching, which ironically led to poorer overall learning outcomes for students. Thus, putting pressure on indicator goals can create misalignment even to the extent of having a net-negative effect on the underlying goal.

Research on goal progress-monitoring shows a similar pattern: The positive effects of indicator-monitoring on underlying goal outcomes are reliable but narrow. In the meta-analysis noted above (Harkin et al., 2015), although monitoring a specific behavior (vs. no monitoring) reliably led to changes in the specified behavior, it did not reliably lead to changes in closely related outcomes. For example, monitoring one's snacking behavior does not reliably lead to changes in weight and vice versa. While this does not speak as clearly to the specific mechanism of misalignment as the examples above, it does suggest once more that focusing on a specific indicator may shift the focus of self-regulation without necessarily improving performance at the underlying goal overall.

Lastly, initial experimental evidence also supports the active component of misalignment—that the pursuit of indicators can lead to pursuing non-substantive means to the indicator. In the clearest demonstration of this (Schweitzer, Ordóñez, & Douma, 2004), participants were tasked with completing anagrams, which involves rearranging a set of letters to create words. In the two key conditions, participants were either given the general goal to do as well as possible or they were given the challenging, indicator-based goal to create nine words for each of the seven rounds. Critically, although participants gave their own report of the number of words they created for each round, the experimenters were also able to surreptitiously assess the true number of words created. As expected, they found that participants who were focused on the specific indicator-goal (vs. the do-your-best goal) were significantly more likely to over-claim, i.e., commit the most clear-cut of non-substantive means to boosting the indicator: blatant misreporting.

A deeper problem: measurement itself causes misalignment

Recent recommendations for goal-setting are accordingly more nuanced and advise caution for the discrepancies between the indicator and underlying goal (Ordóñez et al., 2009; Schroeder & Fishbach, 2015)—but the problem is deeper still. Indeed, the door to misalignment is opened not only with explicit goals, but with the mere awareness of a commonly used indicator. This can be understood by the fact that any means to improve an indicator, by definition, serves the evaluative goal of conveying progress on the underlying goal to oneself and others. This evaluative goal is likely to be strong if important consequences rest on demonstrating one's value, such as funding or career advancement (e.g., Johansson, 2015; Solmon & Podgursky, 2000; Speklé & Verbeeten, 2014). But, even aside from clear consequences, individuals are often powerfully motivated purely for the sake of demonstrating

their value and enhancing their self-image (e.g., Crocker, Olivier, & Nuer, 2009; Leary, Tambor, Terdal, & Downs, 1995). Thus, whether an explicit indicator goal has been set or not, once people are aware that a measure is normatively used as an indicator for an underlying goal, they are more likely to pursue the indicator in and of itself.

Existing evidence of measurement causing misalignment. Consistent with this claim, researchers have documented occurrences of misalignment without active goal-setting for decades (e.g., Bohte & Meier, 2000; Espeland & Sauder, 2007; Gioia & Corley, 2002; Mannion & Braithwaite, 2012; Merton, 1940; Osterloh, 2010; Perrin, 1998; Ridgway, 1956; Van Thiel & Leeuw, 2002; Warner & Havens, 1968). As in the introductory examples of body counts and police clearance rates, management science in particular is rife with historical anecdotes and case studies of misalignment. From healthcare and education to academia and law school administration, the introduction of performance measurement techniques has regularly been associated with unintended consequences. Aside from the general terms of "unintended," "dysfunctional," or "perverse" effects, similar patterns of behavior have been referred to as "goal displacement" (e.g., Bohte & Meier, 2000; Merton, 1940; Perrin, 1998; Warner & Havens, 1968), "the performance paradox" (Osterloh, 2010; Van Thiel & Leeuw, 2002), "reactivity" (e.g., Espeland & Sauder, 2007), and most poetically, "The Circean transformation from substance to image" (Gioia & Corley, 2002).[1]

[1] While these are key related terms, they do not always refer specifically to pursuing indicators at the expense of underlying goals. "Goal displacement," for example, the most common term used for these effects in management research, refers to any change in the primary mission of an organization—as one example, an adult day care center shifting to helping caregivers more than directly helping elderly patients themselves (Abramson, 2009). Similarly, "reactivity" and "the performance paradox" refer to any responses to measurement or observation that lead the measure to lose validity—including both intended and unintended effects on behavior. Thus, I have instead adopted the language of "misalignment," which also has the advantage of conveying a continuum rather than a categorical nature and having a negative but not necessarily immoral connotation.

Notably, many of the case studies of misalignment are in contexts where the indicator was purposefully introduced and incentivized with the intention of controlling behavior, such as the implementation of standardized tests. Consistent with the discussion above, however, many cases also demonstrate that indicators intended purely for assessment can nonetheless take on a controlling role. One dramatic demonstration of this comes from the rankings of post-graduate programs (Espeland & Sauder, 2007; Gioia & Corley, 2002). To provide a useful guide and attract more readers, the *U.S. News and World Report* decided to evaluate university programs on a number of dimensions and publish overall rankings. Though many administrators initially dismissed these rankings, they quickly learned their importance from the strong reactions of students, alumni, and broader media. Ultimately, these publicized university rankings transformed law school (Espeland & Sauder, 2007) and business school administration (Gioia & Corley, 2002). A few examples of the ensuing misalignment involve drastically redirecting money from substantive purposes to marketing, basing law school admission decisions more strictly on LSAT scores even at schools whose mission is to be more accessible and diverse, and pressuring business school faculty to be lenient and "stay current" to keep student evaluations up even at the cost of quality teaching.

In addition to case studies, there have been a few larger-scale empirical studies linking indicator use to misalignment. One excellent example is a study of nearly 2000 firms, which investigated the frequency that firms issued earnings reports as a proxy for greater focus on the indicator of short-term profit (Cheng, Subramanyam, & Zhang, 2005; see also Ruddle & Feeny, 1997). They found that those firms that more frequently issued reports invested relatively little in research and development, which in turn had negative implications for the underlying goal of long-term growth. In addition, a study of 101 Dutch public sector organizations found a negative

relationship between the use of incentivized performance measurement systems and organizational outcomes, as assessed by unit managers (e.g., overall quality, productivity, and innovation; Speklé & Verbeeten, 2014). Other empirical research to my knowledge has not directly assessed the association of indicator use to misalignment; however, many more have documented the existence of misalignment in specific contexts where a commonly-accepted indicator is used (e.g., John, Loewenstein, & Prelec, 2012).

Most importantly for the present review, at least four studies have also investigated moderators of these effects: Given a context where a commonly-accepted indicator is used, what factors are likely to promote more or less misalignment? One study, consistent with the proposed role of evaluative goals, found that those psychologists who reported higher motivation to demonstrate (vs. develop) their skills were more likely to engage in questionable research practices (Janke, Daumiller, & Rudert, 2018). In addition, the study of public sector organizations noted above (Speklé & Verbeeten, 2014) found that the negative association of performance measurement to organizational outcomes was attenuated when the desired output of the organization was relatively clear and easy to measure. Similarly, in a study of 155 English hospitals, they found that a focus on reducing emergency room wait times did not lead to misalignment, which they attributed to the high validity of the indicator (Kelman & Friedman, 2009). Lastly, in a study of 476 Texas public school districts, illegitimate exempting of poor-performing students from tests to artificially improve district pass rates was found to be a common practice, especially in schools where resources were limited and demands on teachers were high (Bohte & Meier, 2000).

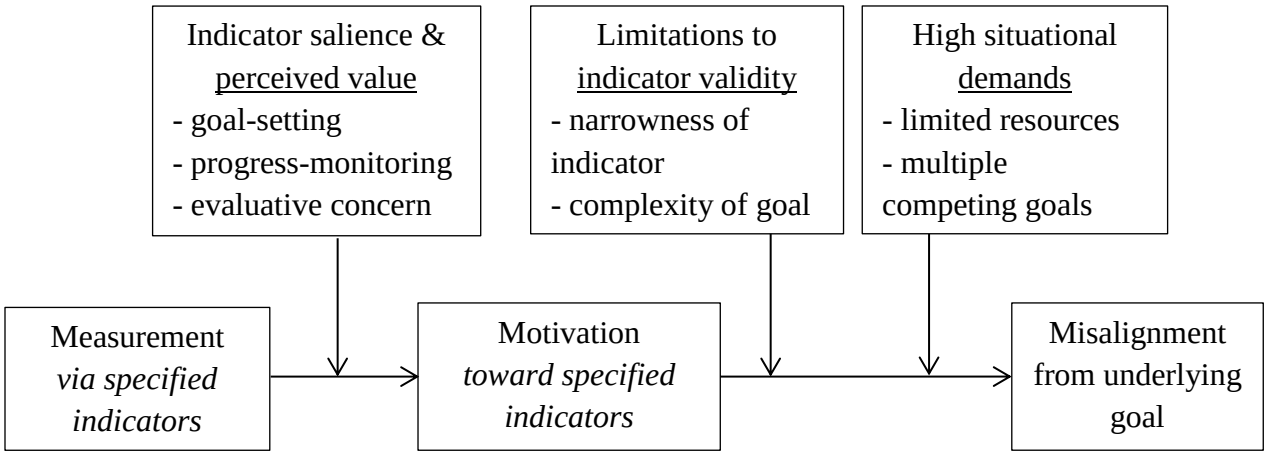
Putting it together: a model of misalignment

Taking this theory and evidence together I outline the following model (see Figure 2). In sum, defining and using a performance indicator can motivate people towards pursuit of that indicator. This process can be facilitated by explicitly monitoring and setting specific goals for that indicator (Latham, Ganegoda, & Locke, 2011; Harkin et al., 2016). However, once a measure is known to be normatively used as an indicator, this motivational process can also occur organically (e.g., Cheng et al., 2005; Espeland & Sauder, 2007; Gioia & Corley, 2002). One identified organic route to indicator-focused motivation is when individuals have a high need to demonstrate their value to others (Janke et al., 2018) but there has been notably less attention to these mechanisms.

Being motivated toward an indicator, in turn, can be good or bad for the underlying goal (Ordóñez et al., 2009 but see also Locke & Latham, 2009). Working toward the indicator is likely to be beneficial when indicators succeed in capturing a large part of the underlying goal. When the indicator does not perfectly capture the underlying goal, however, there is an opportunity for misalignment, e.g., when the indicator is narrow (e.g., Ordóñez et al., 2009; Osterloh, 2010) or when the underlying goal is inherently complex (e.g., Speklé & Verbeeten, 2014; Warner & Havens, 1968). Further, if motivated to pursue an imperfect indicator, misalignment is especially likely when situational demands are high, e.g., with difficult or competing goals (e.g., Gilliland & Landis, 1992; Wright et al., 1993) or when time or resources are stretched thin (e.g., Bohte & Meier, 2000).

Figure 2

A Model Integrating Current Insights on the Antecedents to Misalignment



Building on this existing research, then, there are two gaps I will highlight and address in my dissertation. First, as noted above, an important gap in understanding the antecedents to misalignment can be addressed by studying the social psychological factors that unintentionally or organically promote indicator-focused motivation. Second, there is currently relatively little evidence on the psychological consequences of misalignment which are important in their own right and may ultimately undermine performance on the underlying goal as well. I will address each in turn.

What are the psychological antecedents to misalignment?

In line with the initial findings of Janke and colleagues (2018) noted above, I propose that an evaluative goal to demonstrate one's worth is central to the motivational shift toward pursuing indicators. Indeed, it is a fundamental insight of social psychology that we are deeply sensitive to the evaluation of others (e.g., Asch, 1951; Baumeister & Leary 1995; Crocker et al., 2009; Leary, 2005; Leary, Tambor, Terdal, & Downs, 1995). It is hard to overstate our motivation to have others recognize our value or the importance this holds for our self-esteem and well-being.

Evaluation may never be just an informational endeavor (whether additional rewards are contingent or not). So long as people aware of it, evaluation has a strong potential to be controlling (Deci & Ryan, 1980; Ryan, Mims, & Koestner, 1983).

The imperfection of human evaluation adds an interesting layer to this. If individuals are concerned with the evaluations of other people, they will be motivated particularly toward those aspects of value that they believe are most visible to others. Importantly, though, in contrast to pre-defined indicator goals, this involves first inferring what indicators are used to evaluate us and how much they matter. Indeed, it is this perceived social value of the indicator that I propose as an important determinant of an individual's motivation to pursue it. By "social value," I mean specifically the extent that valued others care about the indicator and give weight to this metric in judgments of the individual. Thus, the perceived social value of an indicator could emerge both from the reality of others weighing the indicator heavily as well as from a biased inference, i.e., thinking the indicator is more valued than it is.

In particular, though we are all sensitive to evaluation, certain individuals have more chronically heightened evaluative concerns than others. For example, those high in attention to social comparison information (ASCI) are conceptualized as being acutely concerned about fitting in (Lennox & Wolfe, 1984), exhibiting greater conformity (Bearden & Rose, 2002), and rating social sources of self-knowledge as more important as compared to self-reflection (Sedikides & Skowronski, 1995). Similarly, those high in self-image goals are conceptualized as expecting judgment from others and being especially concerned about judgment and validation from others (Crocker et al., 2009). These individual differences are therefore strong candidates for identifying who is most likely to fixate on and exaggerate the social value of indicators. In

sum then, I hypothesize that ASCI and self-image goals lead to greater perceptions of an indicator's social value and, in turn, to greater likelihood of misalignment.

What are the psychological consequences of misalignment?

Beyond the immediate problems misalignment poses for the underlying goal, I propose that misalignment is likely to harm individual well-being. For one, misalignment can lead people into morally grey areas, such as teaching to the test and questionable research practices. Acting immorally can violate one's basic beliefs about the self and lead to psychological distress (Giacalone & Promislo, 2010) and can be particularly threatening to one's sense of authenticity. Indeed, we tend to see our "true" selves as inherently moral (Strohminger & Nichols, 2014), and perceiving oneself as acting immorally leads to a sense of alienation from the self (Christy, Seto, Schlegel, Vess, & Hicks, 2016; Zhang, Chen, Schlegel, & Hicks, 2018). There is a deeper way in which misalignment is connected to authenticity as well. Misalignment is not just any questionable behavior; it means straying from a broad, culturally-valued and often a personally-valued goal and doing so in such a way that prioritizes the appearance of that value. It is thus at the core of inauthenticity: pursuing image at the cost of true value.

In turn, authenticity is closely related to other aspects of well-being, including mood and life satisfaction (Wood, Linley, Maltby, Baliousis, & Joseph, 2008); the experience of meaning (both in the workplace and in life broadly; Ménard & Brunet, 2011; Schlegel, Hicks, Arndt, & King, 2009; Schlegel, Hicks, King, & Arndt, 2011); overall work satisfaction; and, among teachers, less burnout (Ménard & Brunet, 2011; van den Bosch & Taris, 2014; Zhang & Zhu, 2007). Thus, I hypothesize that misalignment from underlying goals leads to reduced authenticity and, in turn, reduced well-being.

Overview of the present studies

Five studies examined these predictions. In Studies 1 and 2, I examined the proposed antecedents to misalignment in a sample of undergraduate students—in the context of a variety of indicators such as grades (pursued at the cost of learning) and body weight (pursued at the cost of health). In Studies 3 and 4, I examined the proposed consequences of misalignment in a sample of K-12 teachers, investigating the pursuit of self-identified indicators (primarily standardized tests scores) at the cost of broader teaching goals. Lastly, in Study 5, I examined both antecedents to and consequences of misalignment in a two-part longitudinal study of psychology graduate students, investigating the pursuit of publication count at the cost of meaningfully contributing to science. I predicted that ASCI and self-image goals should predict misalignment and that this relationship should be mediated by the perceived social value of the indicator (Studies 1, 2, and 5). Additionally, I predicted that misalignment should predict a reduced sense of authenticity and well-being at work (e.g., in the context of teaching—greater burnout; Studies 3-5).

Study 1

Study 1 was designed to test the proposed antecedents to misalignment: chronic evaluative concerns (attention to social comparison info, self-image goals; Crocker et al., 2009; Lennox & Wolfe, 1984) and perceived indicator social value across a range of personal indicators. Participants completed measures of these proposed antecedents and measures of misalignment for four indicators: grades, number of pages read, body weight, and number of hours exercised. These indicators were related to two underlying goals, learning and health, due to their common relevance to students. For both learning and health domains, one indicator was

intended to reflect a public outcome that is typically evaluated by others (grades and weight) and one to reflect a more private outcome (number of pages read and number of hours exercised).

I predicted greater perceived social value for the public (vs. private) indicators in each domain. Moreover, I predicted that the perceived social value of each public indicator would be positively correlated with misaligned pursuit of that indicator. I also predicted that individuals high in ASCI and self-image goals would report higher perceived social value of public indicators and, in turn, higher misalignment. I investigated whether these patterns would emerge for the private indicators as well, though these were lower confidence predictions, consistent with my earlier arguments regarding the role of normative indicator use in misalignment.

Method

Participants and design. I recruited 134 students at a large university in the Midwestern United States to participate in an online study for partial course credit (50% female, 50% male; M_{age} = 19.45 years, SD = 1.55; 66.9% Non-Hispanic White, 14.2% Asian, 7.9% Black, 7.1% Hispanic, and 3.9% other). Based on calculations made using G*Power (Faul et al., 2007), this sample provided 76% power to detect a small-to-moderate effect size (r = .20) for indicator-specific analyses and over 99% power for analyses collapsing across all four indicators.

Procedure and materials. The survey consisted of two main sections. In the first section, participants completed four blocks in random order, with one for each of the focal indicators: number of pages read, grades, number of hours exercised, and body weight. The measures included in each of these four indicator blocks are detailed below. In the second section, they then completed a block on individual differences (also detailed below), after which participants were thanked and debriefed.

Indicator blocks. The indicator blocks were identical in structure and most content except that they substituted the name of the relevant indicator and underlying goal into the scale items. There was one further difference which applied to the weight block only. As a weight preference cannot be assumed in the same way that one can assume higher grades and more exercise are generally considered desirable, two additional introductory items were included in this block: "Please indicate whether you personally keep track of your weight" (yes/no) and "If I had to choose, I'd say I more often seek a __ weight" (higher/lower). Apart from this adjustment to the weight block, each indicator block consisted of the same nine measures.[2] I will focus on two of these measures for the present purposes, which were both self-generated (detailed below). For a description of the additional measures, see appendix A.[3]

Perceived indicator social value. Three items were adapted to each block to assess the perceived social value of the indicators: "[Indicator] is relevant to how others evaluate me"; "People care a lot about [indicator]"; "People talk a lot about [indicator]" (αs = .60 - .89). Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Misalignment. Two items were adapted to each block to assess misalignment: one targeting active misalignment, "There are some things I do to [pursue indicator] that don't actually help much in terms of [underlying goal]"; and one targeting passive misalignment, "There are times I do get too focused on [indicator] and, thus, neglect important things in terms

[2] For those who responded that they do not track their weight (n=47), however, I did also omit one measure (self-concordance; noted in appendix A) as it would not apply to this subgroup.

[3] When including these additional measures in the primary analyses, only one of the measures had any effect on the direction or significance of the findings reported. In particular, when controlling for indicator personal value (detailed in appendix A), the relationship of indicator social value to misalignment dropped to marginal, $B = 0.10$, $SE = 0.06$, 95% CI [-0.01, 0.20], $t(535) = 1.72$, $p = .087$, $ß = 0.09$.

of [underlying goal]" (*r*s = .53 - .72).[4] Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Individual differences block. The individual differences block consisted of six measures. I will again focus on a smaller subset for the present purposes.[5] For details on the additional measures, please see appendix A.

Attention to social comparison information. Participants completed an eight-item version of the existing ASCI scale (Lennox & Wolfe, 1984), e.g., "I try to pay attention to the reactions of others to my behavior in order to avoid being out of place," "If I am the least bit uncertain as to how to act in a social situation, I look to the behavior of others for cues," "My behavior often depends on how I feel others wish me to behave," and reverse-coded, "When I am in a social situation, I tend not to follow the crowd, but instead behave in a manner that suits my particular mood at the time" (α = .81).

Self-image goals. Participants completed the existing self-image goals subscale (Crocker, Olivier, & Nuer, 2009). Each item began with the stem, "In general, in your relationship with others, how much do you want to or try to…" Nine items followed, e.g., "get others to respect or admire you," "get others to acknowledge your positive qualities," "demonstrate your intelligence," "avoid showing your weaknesses," and "avoid revealing your shortcomings and vulnerabilities" (α = .87).

[4] I used this language ("There are times I *do* get *too* focused on [indicator]…") to clearly differentiate from the indicator invalidity measure detailed in appendix A, which used similar but hypothetical items (e.g., "If they focused too much on [indicator]…"). This wording could also create demand characteristics, however, which I addressed in Study 2.

[5] None of the other four individual differences measures changed the direction or significance of the primary analyses when included in the models.

Results

I first examined the descriptive levels of perceived social value and misalignment for each indicator, with particular interest in differences by indicator type. As expected, the perceived social value of the public indicator in each domain was higher compared to that of the private indicator. As seen in Table 1, paired samples t-tests revealed higher perceived social value for grades (vs. number of pages read) and for weight (vs. number of hours exercised). Importantly, the perceived social value of grades and weight were also above the neutral midpoint: $t(133) = 23.97$, $p < .001$, 95% CI [1.45, 1.71] and $t(133) = 14.83$, $p < .001$, 95% CI [0.93, 1.21] respectively. Notably, though, the perceived social value of exercise hours was above the neutral midpoint as well, $t(133) = 10.63$, $p < .001$, 95% CI [0.65, 0.95].

Table 1

Mean Differences in Perceived Social Value by Indicator Type (Study 1)

Domain	Private Indicator			Public Indicator			Difference	
	Name	M	SD	Name	M	SD	95% CI	*d*
Learning	Pages read	3.14	1.22	Grades	5.08	0.76	-2.18, -1.69	1.91
Health	Hours exercised	4.30	0.88	Weight	4.57	0.83	-0.47, -0.06	0.32

Similarly, misalignment was found to be higher for the public (vs. private) indicator in each domain. As seen in Table 2, paired samples t-tests revealed greater misalignment for grades (vs. number of pages read) and for weight (vs. number of hours exercised). Misaligned pursuit of grades and misaligned pursuit of weight among those who reported tracking their weight were also above the neutral midpoint: $t(133) = 19.15$, $p < .001$, 95% CI [1.20, 1.48] and $t(86) = 2.83$, $p = .006$, 95% CI [0.11, 0.64] respectively. Notably, though, misaligned pursuit of pages read was above the neutral midpoint as well, $t(133) = 4.52$, $p < .001$, 95% CI [0.25, 0.64].

Table 2

Mean Differences in Misalignment by Indicator Type (Study 1)

Domain	Private Indicator			Public Indicator			Difference	
	Name	M	SD	Name	M	SD	95% CI	*d*
Learning	Pages read	3.95	1.15	Grades	4.84	0.81	-1.10, -0.69	0.90
Health	Hours exercised	3.27	1.30	Weight[6]	3.57	1.34	-0.50, -0.09	0.23

Testing proposed antecedents: indicator social value. My primary interest was in the association of indicator social value to misalignment. To examine this, I regressed misalignment on indicator social value. Testing first across all four indicators, indicator social value was a significant predictor of misalignment, $B = 0.35$, $SE = 0.05$, 95% CI [0.26, 0.44], $t(535) = 7.56$, $p < .001$, $ß = 0.31$. Testing this model for each indicator individually, the same consistent pattern of association emerged across both public and private indicators: greater social value of number of pages read predicted misaligned pursuit of pages read, $B = 0.27$, $SE = 0.08$, 95% CI [0.12, 0.43], $t(133) = 3.44$, $p = .001$, $ß = 0.29$; greater social value of grades predicted misaligned pursuit of grades, $B = 0.34$, $SE = 0.09$, 95% CI [0.16, 0.51], $t(133) = 3.85$, $p < .001$, $ß = 0.32$; greater social value of exercise hours predicted misaligned pursuit of exercise hours, $B = 0.54$, $SE = 0.12$, 95% CI [0.30, 0.78], $t(133) = 4.46$, $p < .001$, $ß = 0.36$; and greater social value of weight predicted misaligned pursuit of weight, $B = 0.45$, $SE = 0.13$, 95% CI [0.19, 0.72], $t(133) = 3.37$, $p = .001$, $ß = 0.28$.

Testing proposed antecedents: chronic evaluative concern. Lastly, I examined the proposed upstream antecedents of attention to social comparison information (ASCI) and self-image goals. As these variables were moderately correlated with each other ($r = .33$, $p < .001$), I completed each set of analyses controlling for the other. I first simultaneously regressed misalignment on ASCI and self-image goals and found significant independent predictors of

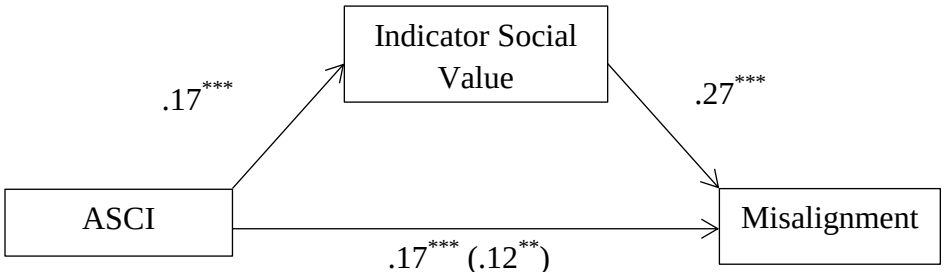
[6] Weight misalignment was significantly higher for those who reported tracking their weight (vs. not): M = 3.87, SD = 1.23, $t(132) = -3.73$, $p < .001$, 95% CI [-1.32, -0.41].

misalignment in both ASCI, $B = 0.25$, $SE = 0.07$, 95% CI [0.12, 0.38], $t(535) = 3.81$, $p < .001$, ß = 0.17, and self-image goals, $B = 0.20$, $SE = 0.09$, 95% CI [0.02, 0.38], $t(535) = 2.19$, $p = .029$, ß = 0.10. Next, I tested and found significant independent predictors of indicator social value in both ASCI, $B = 0.23$, $SE = 0.08$, 95% CI [0.11, 0.34], $t(535) = 3.84$, $p < .001$, ß = 0.17, and self-image goals, $B = 0.24$, $SE = 0.08$, 95% CI [0.08, 0.40], $t(535) = 2.93$, $p = .004$, ß = 0.13. In addition, indicator social value remained a significant predictor when controlling for both ASCI and self-image goals, $B = 0.30$, $SE = 0.05$, 95% CI [0.21, 0.40], $t(535) = 6.50$, $p < .001$, ß = 0.27.

Using the bootstrapping method with 10,000 samples (Hayes, 2013), I found a significant indirect path of ASCI to misalignment through indicator social value (when controlling for self-image goals), 95% CI [0.031, 0.122]. See Figure 3. These findings were consistent when testing each indicator individually: 95% CI [0.004, 0.202] for pages read; 95% CI [0.003, 0.143] for grades; 95% CI [0.007, 0.227] for hours exercised; 95% CI [0.003, 0.159] for weight.

Figure 3

Association of Attention to Social Comparison Information to Misalignment via Indicator Social Value (Study 1)



Indirect Effect: 95% Bootstrap CI [0.03, 0.12]

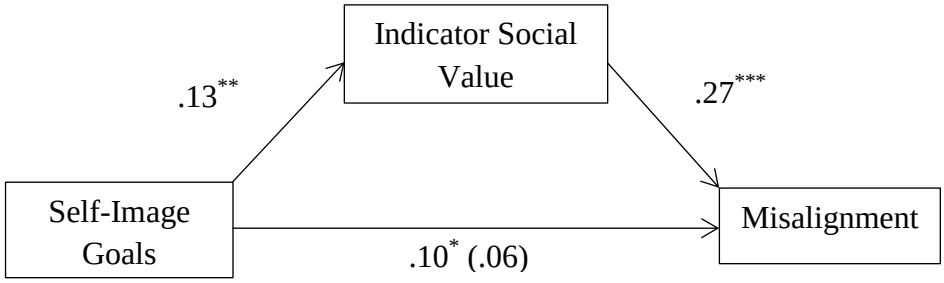
Note. Standardized regression coefficients, when controlling for self-image goals, for the relationship between attention to social comparison information and misalignment as mediated by indicator social value. Bootstrap with 10,000 samples.
*$p < .05$, **$p < .01$, ***$p < .001$.

Using the same method, I also found an indirect path of self-image goals to misalignment through indicator social value (when controlling for ASCI), 95% CI [0.021, 0.144]. See Figure 4.

Testing each indicator individually, grades and weight showed evidence of an indirect path: 95% CI [0.001, 0.142] and 95% CI [0.043, 0.372] respectively, but the other variables only provided evidence that was possibly consistent with an indirect path: 95% CI [-0.067, 0.134] for pages read; 95% CI [-0.009, 0.288] for hours exercised.

Figure 4

Association of Self-Image Goals to Misalignment via Indicator Social Value (Study 1)



Indirect Effect: 95% Bootstrap CI [0.02, 0.14]

Note. Standardized regression coefficients, when controlling for attention to social comparison information, for the relationship between self-image goals and misalignment as mediated by indicator social value. Bootstrap with 10,000 samples.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Discussion

Consistent with hypotheses, the perceived social value of indicators predicted misalignment, i.e., pursuing those indicators even at the expense of a key underlying goal it measures. This was consistent across all four indicators, which was a particularly conservative test in the case of the indicators of private outcomes. While certain indicators like grades were more systematically perceived as socially valuable and prone to misalignment than others, this pattern of results suggests that even seemingly-private measures of progress, like the number of pages one reads or the number of hours one exercises, may be inferred as socially-valued and therefore become a potential liability for the underlying goal.

Also consistent with hypotheses, those chronically high in evaluative concerns were especially likely to see indicators as socially valued and to experience misalignment. This pattern held across both public and private indicators. It was slightly weaker for self-image goals, but robust across all four indicators for attention to social comparison information. Further, mediation analyses supported the hypothesis that evaluative concerns are related to misalignment through the perceived social value of the indicators. Importantly as well, although the associations of chronic evaluative concerns to proposed outcomes in general were not especially strong, having a slight but consistent likelihood to see indicators as more socially valued and to experience more misalignment—when accumulated over the vast number of potential indicators and over time—could have much larger implications (Funder & Ozer, 2019).

Notably, however, the measure of misalignment could be capturing very different underlying phenomena. In particular, participants in this study reported the extent to which they pursued indicators at the expense of a given underlying goal. At one end of a spectrum, an individual may have intended to pursue the indicator at the expense of the culturally-valued underlying goal and, according to intentions, become misaligned. At the other end of this spectrum, an individual may have fully intended to prioritize the underlying goal and yet become misaligned despite this intention. For example, a student who pursues grades at the cost of learning could be unmotivated to learn and exploiting the system intentionally. Alternatively, the student could be unintentionally misaligned from his or her own personally-valued goal of learning. As outlined earlier, I propose that misalignment can occur even in this latter more unintentional form. Study 2 was designed to directly test this possibility by teasing apart the level of intentionality from misalignment.

Study 1 also had some notable methodological limitations. First, the three-item measure of perceived indicator social value had relatively low internal reliability. In addition, this measure could be picking up on perceived underlying goal social value, e.g., people may think others care about grades because they think others care about learning generally. This is important because perceived underlying goal social value may independently be a negative predictor of misalignment, thus acting as a suppressor of the relationship between indicator social value and misalignment. An additional measurement concern was that the wording of the misalignment measure could potentially create demand effects. Lastly, the statistical power for the indicator-specific analyses was relatively low. Thus, a second aim of Study 2 was to address these limitations by refining these measures and using a larger sample size.

Study 2

Study 2 examined the antecedents to misalignment using a similar design to Study 1, except with a larger sample size, measure refinements, and the addition of two new measures. In particular, Study 2 included a measure of participants' intentions to prioritize the indicator versus the underlying goal and a measure of the perceived social value of the underlying goal. In addition, this study focused only on two indicators, grades and weight, as these were confirmed as the highest in average perceived social value and thus the context in which the proposed effects are likely to occur most systematically. As in Study 1, I hypothesized: 1) that perceived indicator social value would predict misalignment and 2) that ASCI and self-image goals would predict greater perceived indicator social value and, in turn, greater misalignment. In addition, I hypothesized that the association of proposed antecedents and misalignment would hold even controlling for intentional indicator priority, i.e., that evaluative concern would create misalignment even for those who personally value and intend to prioritize the underlying goal.

Lastly, I included the measure of perceived underlying goal social value in order to more clearly disentangle its effect on misalignment from that of the perceived indicator social value. Thus, Study 2 had two main goals building on Study 1: to replicate these prior findings with more rigorous measures and to test the independent associations of perceived indicator social value to misalignment when controlling for intentional indicator priority and underlying goal social value.

Method

Participants and design. I recruited 247 students at a large university in the Midwestern United States to participate in an online study for partial course credit (68% female, 31% male; M_{age} = 18.94 years, SD = 2.08; 60.3% Non-Hispanic White, 25.5% Asian, 5.7% Black, 5.7% Hispanic, and 2.8% other). Based on calculations made using G*Power (Faul et al., 2007), this final sample provided 94% power to detect a small-to-moderate effect size (r = .20) for indicator-specific analyses and over 99% power for analyses collapsing across both indicators.

Procedure and materials. Participants completed the two main sections in counter-balanced order: as before, one on the target indicators and one on individual differences. The two indicator blocks—grades and weight—were presented in random order. Lastly, I made changes in both sections to improve the psychometric properties of the measures, as detailed below. At the end, participants were thanked and debriefed.

Indicator blocks. As in Study 1, the grades and weight blocks included similar measures to each other, only they substituted the name of the relevant indicator and underlying goal into the scale items as necessary. The four measures of present focus were indicator social value and misalignment (with adjustments—as detailed below), as well as the two new measures: underlying goal social value and intentional indicator priority (also detailed below). For additional measures, see appendix B. Also as before, I included one additional measure in the

weight block to assess weight-tracking. For a more nuanced measure of the frequency that participants monitor their weight, rather than a binary response, participants used a continuous scale from 1 (once a year or less) to 5 (most or everyday).[7]

Indicator social value. To better capture the perceived social value of the indicators, the original three-item scale (see Study 1) was expanded to include four additional items: "[Indicator] is important to people"; "People notice each other's [indicator]"; "People judge each other based on [indicator]"; and "People judge me based on [indicator]." Improved inter-item reliabilities were observed (full scale α = .85 for grades and .87 for weight).

Underlying goal social value. The perceived social value of the underlying goal was assessed using the same seven-item scale as for indicator social value above—only substituting in the name of the underlying goal instead of the indicator, e.g., "People judge me based on [underlying goal]" (α = .88 for learning and .79 for health and fitness).

Misalignment. The measure of misalignment was the same as in Study 1, only with a slight adjustment to the wording of one item to minimize demand characteristics. Rather than "There are times I do get too focused on [indicator] and, thus, neglect important things in terms of my [broader goal]," the first clause in this item was adjusted to "There are times I get narrowly focused" (r = .68 for grades and .70 for weight).

Intentional indicator priority. Lastly, two new items assessed the extent to which participants intentionally prioritize indicators vs. corresponding underlying goals. The measure was introduced as follows: "Although the pursuit of [indicator] and [underlying goal] may usually be complementary, the next items are about which you value more strongly (to the extent

[7] The binary assessment of weight-tracking in Study 1 was found too crude in some cases, e.g., 30.4% of those who initially reported "no" to weight-tracking subsequently reported that they at least "somewhat agree" that they regularly check or consider their weight.

that they do differ).” The first item asked, “Between [indicator] and [underlying goal], which matters more to you?” to which participants responded on a seven-point scale from 1(*[indicator] matters much more*) to 7(*[underlying goal] matters much more*). The second item asked, “Which do you intend to pursue more strongly at this stage?” to which participants responded on a seven-point scale from 1(*[indicator] much more*) to 7(*[underlying goal] much more*). In the analyses, both items were reverse-coded such that higher numbers represented greater indicator priority (r = .68 for grades and r = .74 for weight).

Individual differences block. Three individual differences were assessed in Study 2, all established scales presented in random order: attention to social comparison information (this time, the full subscale, α = .85; Lennox & Wolfe, 1984), self-image goals as before (α = .82; Crocker, Olivier, & Nuer, 2009), and one additional measure that is not the focus of my dissertation (see appendix B for details).

Results

I began by examining the descriptive levels of perceived indicator social value, underlying goal social value, misalignment, and intentional indicator priority for both grades and weight (see Table 3). As before, the perceived social value of grades and weight were both well above the neutral midpoint: $t(246) = 21.66$, $p < .001$, 95% CI [1.05, 1.25] and $t(246) = 19.41$, $p < .001$, 95% CI [0.99, 1.22] respectively. Similarly, the perceived social value of learning and of health and fitness were above the neutral midpoint: $t(246) = 11.45$, $p < .001$, 95% CI [0.53, 0.75] and $t(246) = 22.49$, $p < .001$, 95% CI [1.04, 1.24] respectively. Next, misalignment was again more pronounced for grades, but was above the neutral midpoint for both grades, $t(246) = 14.92$, $p < .001$, 95% CI [0.89, 1.16], and weight, $t(246) = 2.04$, $p = .042$, 95% CI [0.01, 0.35]. Parallel to the differences in misalignment, there was an average preference of pursuing grades over

learning, $t(246) = 6.51$, $p < .001$, 95% CI [0.43, 0.80]; but, conversely, of pursuing health and fitness over weight, $t(246) = -6.67$, $p < .001$, 95% CI [-0.88, -0.48].

Table 3

Descriptive Statistics for Misalignment and Conceptually Related Variables (Study 2)

Indicator (Underlying Goal)	Indicator Social Value		Underlying Goal Social Value		Misalignment		Intentional Indicator Priority	
	M	SD	M	SD	M	SD	M	SD
Grades (Learning)	4.65	0.83	4.14	0.88	4.53	1.08	4.62	1.49
Weight (Health/Fitness)	4.60	0.89	4.64	0.80	3.68	1.37	3.32	1.59

Testing proposed antecedents: indicator social value. To test the primary hypotheses, I first regressed misalignment on indicator social value. Testing both indicators, overall, I found that indicator social value was a predictor of misalignment, $B = 0.40$, $SE = 0.07$, 95% CI [0.27, 0.53], $t(492) = 6.08$, $p < .001$, $ß = 0.26$. In addition, testing grades and weight individually, the same pattern of association emerged: greater social value of grades predicted misaligned pursuit of grades, $B = 0.31$, $SE = 0.08$, 95% CI [0.16, 0.47], $t(246) = 3.91$, $p < .001$, $ß = 0.24$; and greater social value of weight predicted misaligned pursuit of weight, $B = 0.45$, $SE = 0.09$, 95% CI [0.26, 0.63], $t(245) = 4.76$, $p < .001$, $ß = 0.29$.

Using the same analytical method, I also found that intentional indicator priority was a predictor of misalignment, $B = 0.30$, $SE = 0.03$, 95% CI [0.24, 0.36], $t(492) = 9.19$, $p < .001$, $ß = 0.38$. As expected, however, when including both indicator social value and intentional indicator priority as simultaneous predictors, indicator social value remained a predictor, $B = 0.32$, $SE = 0.06$, 95% CI [0.20, 0.45], $t(492) = 5.22$, $p < .001$, $ß = 0.21$. These findings also held when examining only grades, $B = 0.29$, $SE = 0.08$, 95% CI [0.14, 0.44], $t(246) = 3.70$, $p < .001$, $ß = 0.22$; as well as when examining only weight, $B = 0.37$, $SE = 0.09$, 95% CI [0.19, 0.55], $t(245) = 3.96$, $p < .001$, $ß = 0.24$.

I next examined perceived underlying goal social value—which, as expected, was related to but distinct from perceived indicator social value (r = .46, p < .001). Regressing misalignment on underlying goal social value, there was no evidence that underlying goal social value was a predictor of misalignment, B = 0.04, SE = 0.07, 95% CI [-0.10, 0.17], t(492) = 0.55, p = .581, ß = 0.25. Moreover, when regressing misalignment simultaneously on indicator and underlying goal social value, underlying goal social value became a negative predictor, B = -0.18, SE = 0.07, 95% CI [-0.33, -0.04], t(492) = -2.53, p = .012, ß = -0.12, and the independent association of misalignment to indicator social value became stronger in the positive direction, B = 0.49, SE = 0.07, 95% CI [0.34, 0.63], t(492) = 6.59, p < .001, ß = 0.32. Notably, though, when examining grades and weight individually, this finding did not hold: there was no evidence that the perceived social value of learning was a negative predictor of misalignment, B = -0.09, SE = 0.08, 95% CI [-0.26, 0.07], t(246) = -1.14, p = .257, ß = -0.08, nor that perceived social value of health and fitness was a negative predictor of misalignment, B = 0.12, SE = 0.13, 95% CI [-0.14, 0.38], t(245) = 0.94, p = .351, ß = 0.07.

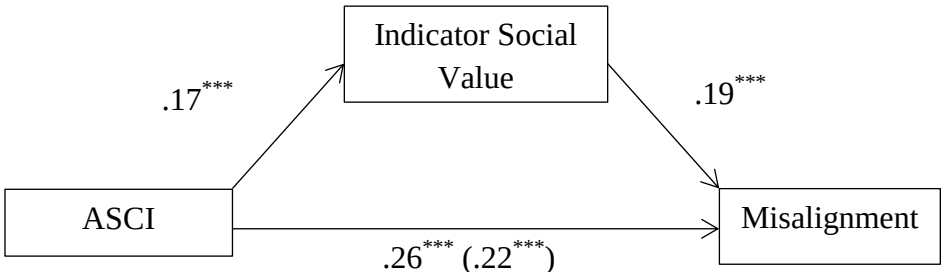
Testing proposed antecedents: chronic evaluative concern. Next, I examined attention to social comparison information (ASCI) and self-image goals. As before, ASCI and self-image goals were moderately correlated (r = .30, p < .001), so I completed each set of analyses controlling for the other. First, collapsing across indicators, I simultaneously regressed misalignment on ASCI and self-image goals. ASCI was a predictor of misalignment, B = 0.44, SE = 0.08, 95% CI [0.29, 0.59], t(490) = 5.64, p < .001, ß = 0.26; as were self-image goals, B = 0.26, SE = 0.10, 95% CI [0.07, 0.45], t(490) = 2.64, p = .009, ß = 0.12. Next, I tested and found that ASCI was a predictor of indicator social value, B = 0.19, SE = 0.05, 95% CI [0.09, 0.30], t(491) = 3.73, p < .001, ß = 0.17; as were self-image goals, B = 0.23, SE = 0.07, 95% CI [0.10,

0.36], $t(491) = 3.56$, $p < .001$, $ß = 0.16$. In addition, indicator social value remained a predictor when controlling for both ASCI and self-image goals, $B = 0.29$, $SE = 0.07$, 95% CI [0.16, 0.42], $t(490) = 4.39$, $p < .001$, $ß = 0.19$.

Using the bootstrapping method with 10,000 samples (Hayes, 2013), I found an indirect path of ASCI to misalignment through indicator social value (when controlling for self-image goals), 95% CI [0.02, 0.11]. See Figure 5. This indirect path held when examining only grades, 95% CI [0.01, 0.11], as well as when examining only weight, 95% CI [0.02, 0.15].

Figure 5

Association of Attention to Social Comparison Information to Misalignment via Indicator Social Value (Study 2)

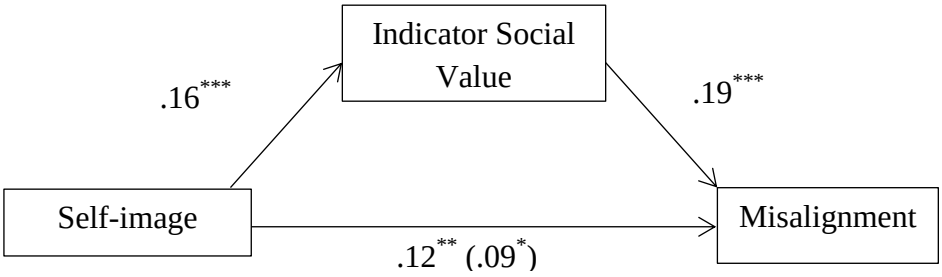


Note. Standardized regression coefficients, when controlling for self-image goals, for the relationship between attention to social comparison information and misalignment as mediated by indicator social value. Bootstrap with 10,000 samples.
*$p < .05$, **$p < .01$, ***$p < .001$.

I also found an indirect path of self-image goals to misalignment through indicator social value (when controlling for ASCI), 95% CI [0.02, 0.14]. See Figure 6. This indirect path held when examining only grades, 95% CI [0.009, 0.140], as well as when examining only weight, 95% CI [0.003, 0.191].

Figure 6

Association of Self-Image Goals to Misalignment via Indicator Social Value (Study 2)



Indirect Effect: 95% Bootstrap CI [0.02, 0.14]

Note. Standardized regression coefficients, when controlling for attention to social comparison information, for the relationship between self-image goals and misalignment as mediated by indicator social value. Bootstrap with 10,000 samples.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

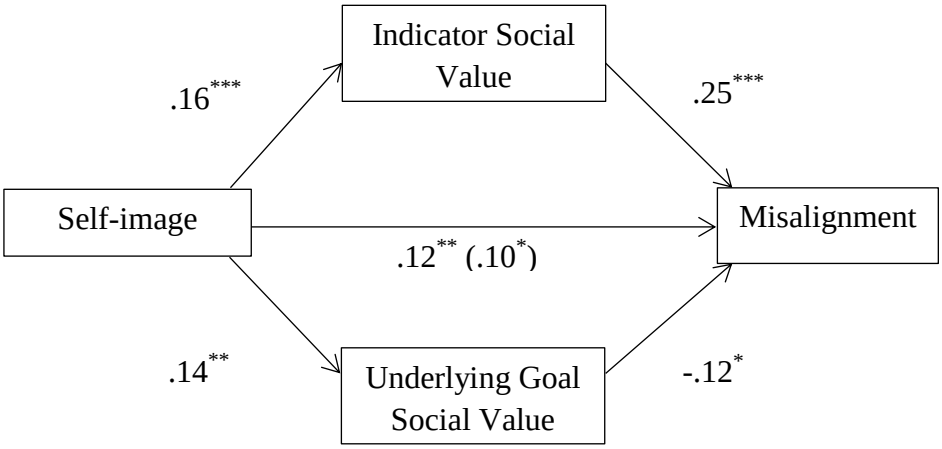
Exploratory analyses differentiating chronic evaluative concerns. As I consistently observed stronger associations of ASCI (vs. self-image goals) to misalignment, I did follow-up analyses to test if a competing indirect path may exist for self-image goals. I was interested in whether self-image goals (but not ASCI) would predict underlying goal social value—which in turn would predict lower misalignment (at least, as seen above, in analyses collapsing across both conditions). To test this, I first regressed underlying goal social value on ASCI and self-image goals. Consistent with predictions, self-image goals were a predictor of underlying goal social value, $B = 0.21$, $SE = 0.07$, 95% CI [0.07, 0.34], $t(491) = 3.02$, $p = .003$, $ß = 0.14$, whereas ASCI showed no evidence of predicting underlying goal social value, $B = 0.05$, $SE = 0.05$, 95% CI [-0.06, 0.15], $t(491) = 0.83$, $p = .408$, $ß = 0.04$. Next, I simultaneously regressed misalignment on indicator social value and underlying goal social value, while also controlling for ASCI and self-image goals. In this model, underlying goal social value was indeed a negative predictor of misalignment, $B = -0.18$, $SE = 0.07$, 95% CI [-0.32, -0.04], $t(490) = -2.56$, $p = .011$, $ß = -0.12$;

indicator social value remained a positive predictor, $B = 0.38$, $SE = 0.07$, 95% CI [0.23, 0.52], $t(490) = 5.09$, $p < .001$, $ß = 0.25$.

Using the bootstrapping method with 10,000 samples (Hayes, 2013), I tested a model with indicator social value and underlying goal social value as simultaneous mediators and ASCI as a covariate. I found indirect paths from self-image goals to misalignment through indicator social value, 95% CI [0.030, 0.163], as well as through underlying goal social value, 95% CI [-0.090,-0.007]. See Figure 7. When testing the same model for ASCI while controlling for self-image goals, there was little evidence for the indirect path from ASCI to misalignment through underlying goal social value, 95% CI [-0.042, 0.011].

Figure 7

Association of Self-Image Goals to Misalignment via Indicator Social Value and Underlying Goal Social Value (Study 2)



Note. Standardized regression coefficients, when controlling for attention to social comparison information, for the relationship between self-image goals and misalignment as mediated by indicator social value and underlying goal social value.
*$p < .05$, **$p < .01$, ***$p < .001$.

Discussion

Study 2 replicated the finding that the perceived social value of indicators—in this case grades and weight—predicted misaligned pursuit of those indicators, using a larger sample size

and refined measures. Further, although intentional indicator priority was also related to misalignment, perceived indicator social value remained a significant predictor of misalignment even when this factor was included simultaneously in the model. This suggests that regardless of one's own values and intent, perceiving an indicator as socially valued can lead to misalignment, i.e., people can become misaligned even from their own closely-held underlying goals. When controlling for perceived underlying goal social value, as well, perceived indicator social value remained a significant predictor of misalignment—and, as expected, a directionally stronger one.

In addition, Study 2 replicated the finding that ASCI and to a slightly lesser extent self-image goals predicted perceived indicator social value and, in turn, greater misalignment. Although not intentionally designed to test this question, the current study also enabled an exploration of an open question from both studies: why did ASCI emerge as a stronger predictor of misalignment as compared to self-image goals? One possible distinction is that ASCI with its focus on "fitting in" is a more superficial evaluative concern when it comes to performance (e.g., appear adequately like you're keeping up with others), whereas self-image goals with its focus on broad positive qualities, like appearing "intelligent" and "admirable" overall, is a deeper evaluative concern (e.g., appear to have good character as a whole). Consistent with this interpretation, those high in ASCI and self-image goals both had a stronger sense of being judged by indicators, but only those high in self-image goals also felt judged more broadly by the underlying goal. Examining whether these associations replicate in future work may help sharpen our understanding of these individual differences and the distinctions between them. Further, given that the perceived social value of the indicator and the underlying goal, in turn, had opposite associations to misalignment, this indeed provides a possible explanation of why self-image goals have been a weaker predictor of misalignment as compared to ASCI.

Taken together, the findings of these first two studies provide consistent evidence that perceived indicator social value predicts misalignment across a variety of situations—whether the underlying goal is one the individual personally intends to prioritize or not, as well as for both public and private indicators. In addition, they provide initial insight into who is most prone to misalignment. Nonetheless, these studies are limited in their focus only on an undergraduate student sample. One might expect misalignment to play out differently in an organizational context where clear incentives rest on the indicator—a condition which is less apparent with the performance indicators tested thus far, with the exception perhaps of grades. Study 3 was thus designed to address the consequences of misalignment for well-being using a new sample and an organizational target indicator.

Study 3

Study 3 was designed to examine a different psychological facet of misalignment: its consequences for well-being. This study also shifted to a more prototypical organizational context for observing misalignment—in particular, misalignment among K-12 teachers. This context was selected partly due to the prevalence and importance of misalignment in education, especially as a result of high stakes testing: from misrepresenting test scores to systematic curriculum narrowing (e.g., Beatty, 2004; Bohte & Meier, 2000; Ryan & Weinstein, 2009). In addition, well-being consequences are especially important in education due to the major problems of teacher burnout and turnover in U.S. schools, which has indeed been linked to the high demands placed on teachers and even specifically to test-focused teaching reforms (e.g., Ingersoll, 2001; Dworkin, 2005). Yet, no research to my knowledge has directly examined the impact of teacher misalignment on well-being and commitment. Thus, Study 3 was designed to test the hypothesis that misalignment would predict a reduced sense of authenticity at work

within a teacher sample—as well as to test the associations to potential downstream consequences of burnout and overall satisfaction and commitment to one's work. To do so, I asked teachers to identify a common indicator used to assess their teaching quality and to rate their misaligned pursuit of this indicator, as well as to complete measures of their workplace well-being.

Method

Participants and design. At the end of the 2017 school year, 200 individuals who identified their industry in a pre-survey as education were recruited using TurkPrime, a platform connected to Amazon's Mechanical Turk online marketplace (Buhrmester, Kwang, & Gosling, 2011). They participated in a ten-minute survey, "Thoughts on Teaching Evaluations," in exchange for monetary compensation. Of those recruited, 22 were not part of the intended population (e.g., retired teachers, substitutes) and were thus excluded. The final sample consisted of 178 full-time K-12 teachers (63% female; M_{age} = 37.1 years, SD = 9.3). They had an average of 9.0 years of experience in teaching (SD = 6.6), with an average class size at the time of 24.6 students (SD = 26.1). All taught in the United States (40 states represented) and 76% reported teaching in public schools. Based on calculations made using G*Power (Faul et al., 2007), this final sample provided 86% power to detect a small-to-moderate effect size (r = .20).

Procedure and materials. After completing initial questions on their teaching background, participants identified a teaching indicator relevant to them, i.e., "a key measure that is intended to assess your class' progress and, thereby, your performance as a teacher." Based on the most common responses in a pre-test, they chose from "reading level assessments," "standardized tests," and "other" which allowed them to specify their own. Participants then completed a series of brief measures. First, they completed three introductory measures which

were conceptually related to misalignment but beyond the scope of this dissertation (detailed in appendix C).[8] The remaining measures were presented in two blocks which were counter-balanced to test for order effects. One block included misalignment (detailed below) and performance (also detailed in appendix C).[9] The other block included the well-being measures in fixed order: burnout, work authenticity, and overall work satisfaction (detailed below), as well as a measure designed to assess "cognitive deconstruction" (Twenge, Catanese, & Baumeister, 2003; detailed in appendix C).[10] After demographics, participants were thanked and debriefed.

Misalignment. Misalignment was assessed using the same two items as in previous studies except adapted to teaching: "There are some things I do to improve [indicator] that don't actually help much in terms of my broad teaching goals" and "There are important things that I've neglected in terms of my broad teaching goals due to focusing on [indicator]" (r = .48). Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Work authenticity. Feelings of authenticity at work were assessed using six items (adapted from Wood, Linley, Maltby, & Baliousis, 2008), e.g., "At work, I act in accordance with my values and beliefs," "At work, I feel out of touch with the 'real me,'" "At work, I am strongly influenced by the opinions of others," and "At work, I feel as if I don't know myself very well" (α = .76). Note the last three sample items are reverse-coded. Participants responded using 6-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Burnout. The frequency of burnout was assessed using nine items from an existing scale (Maslach & Jackson, 1981), e.g., "I feel emotionally drained from my work," "I feel fatigued

[8] Including these measures did not change the direction or significance of any of the analyses presented below.
[9] Including performance did not change the direction or significance of any of the analyses presented below.
[10] This measure was omitted in Study 3 and 4 due to validity concerns. However, misalignment was positively related to cognitive deconstruction (r = .36, p < .001); i.e., the findings for this measure were consistent with the hypothesis that misalignment leads to reduced well-being.

when I get up in the morning and have to face another day on the job," "I've become more callous towards people since I took this job," and reverse-coded, "I feel I'm positively influencing other people's lives through my work" (α = .81). Participants responded using 9-point scales from 1(*never*) to 9(*everyday)*.

Teaching satisfaction and commitment. Overall satisfaction and commitment to teaching was assessed using five self-generated items (α = .79). The first three items were: "I feel satisfied with my job as a teacher," "I feel satisfied with myself as a teacher," and "I feel satisfied with the education system," which used 6-point scales from 1(*strongly disagree*) to 6(*strongly agree*). The last two items were "How likely is it that you will continue as a teacher for the rest of your career?" and "How likely is it that you would choose teaching as a path if you had to do it again?" which used scales from 1(*extremely unlikely*) to 6(*extremely likely*).

Results

When asked to select a key teaching indicator relevant to them, 52% of teachers chose "standardized tests," 28% chose "reading level assessments," and 20% chose "other" and identified their own. The most common categories of self-identified indicators were non-standardized tests (4%), student evaluations (3%), classroom observations (2%), and pass rates (2%). Next, I examined the descriptive statistics for misalignment. On average, participants reported being somewhat misaligned (M = 4.12, SD = 1.05), which was significantly higher than the neutral midpoint, $t(177) = 7.79$, $p < .001$, 95% CI [0.46, 0.77].

Implications of misalignment for well-being and performance. Next, and most importantly, I was interested in the relationship of misalignment to well-being. To examine this, I regressed each workplace well-being measure on misalignment, in three separate models. As expected, misalignment was a negative predictor of work authenticity, B = -0.23, SE = 0.05, 95%

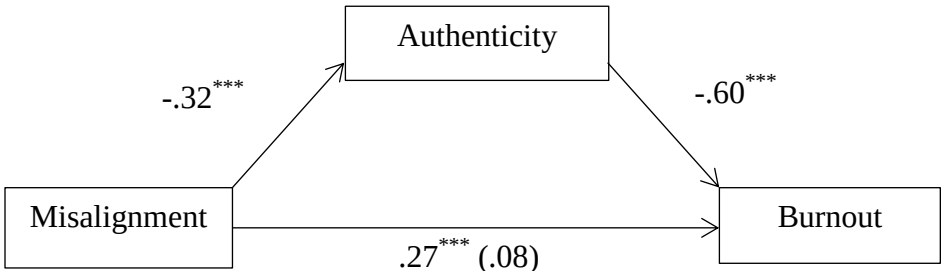
CI [-0.33, -0.13], $t(177) = -4.47$, $p < .001$, $ß = -0.32$. Misalignment was also a positive predictor of burnout, $B = 0.25$, $SE = 0.07$, 95% CI [0.12, 0.38], $t(177) = 3.68$, $p < .001$, $ß = 0.27$. There was no evidence, however, that misalignment was a predictor of overall teaching satisfaction and commitment, $B = -0.07$, $SE = 0.07$, 95% CI [-0.20, 0.07], $t(177) = -0.98$, $p = .331$, $ß = -0.07$.

Notably, these findings were not qualified by order effects. There was no or only very weak evidence that completing the misalignment and performance block before vs. after the well-being block affected misalignment, $B = -0.11$, $SE = 0.08$, 95% CI [-0.27, 0.05], $t(177) = -1.40$, $p = .164$, $ß = -0.11$; authenticity, $B = 0.08$, $SE = 0.06$, 95% CI [-0.04, 0.19], $t(177) = 1.34$, $p = .182$, $ß = 0.10$; burnout, $B = -0.09$, $SE = 0.07$, 95% CI [-0.23, 0.06], $t(177) = -1.15$, $p = .252$, $ß = -0.09$; or teaching satisfaction and commitment, $B = 0.01$, $SE = 0.07$, 95% CI [-0.13, 0.15], $t(177) = 0.19$, $p = .850$, $ß = 0.01$.

Mediation through authenticity. Next, I examined whether there was evidence consistent with the effect of misalignment on burnout operating via authenticity. When simultaneously regressing burnout on misalignment and authenticity, the association of misalignment to burnout was attenuated, $B = 0.07$, $SE = 0.06$, 95% CI [-0.04, 0.19], $t(177) = 1.23$, $p = .221$, $ß = 0.08$, while authenticity remained a negative predictor, $B = -0.77$, $SE = 0.08$, 95% CI [-0.93, -0.61], $t(177) = -9.62$, $p < .001$, $ß = -0.60$. The bootstrapping method with 10,000 samples (Hayes, 2013) revealed an indirect path from misalignment to burnout through reduced authenticity, 95% Bootstrap CI [0.09, 0.28] (see Figure 8).

Figure 8

Association of Misalignment to Burnout via Authenticity (Study 3)



Indirect Effect: 95% Bootstrap CI [0.09, 0.28]

Note. Standardized regression coefficients for the relationship between misalignment and burnout as mediated by authenticity. Bootstrap with 10,000 samples.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Discussion

As hypothesized, when teachers pursued a self-identified indicator at the cost of their broad teaching goals, this greater experience of misalignment was related to lower well-being at work: specifically, lower work authenticity and more frequent feelings of burnout. A mediation pathway was significant, consistent with the hypothesis that the effect of misalignment on burnout is mediated through reduced authenticity—which was also consistent with past work on the role of inauthenticity in burnout (Ménard & Brunet, 2011; van den Bosch & Taris, 2014; Zhang & Zhu, 2007). This study did not provide evidence, on the other hand, that misalignment predicts overall teaching satisfaction and commitment. Interestingly, though, the measure used for satisfaction and commitment was primarily focused on teaching itself, whereas much more goes into the profession of being a teacher. Indeed, a narrow focus on increasing test scores or other indicators, even at the expense of what one feels is quality teaching, may not feel like a problem with teaching per se, but with other aspects of one's current job as a teacher. I wondered then, if misalignment may affect satisfaction and commitment to one's current job, even if not to education in general—a possibility which the current measure was unable to capture.

Study 3 had other methodological limitations as well. For one, as in any correlational research, a number of third variables could potentially explain the associations of misalignment and proposed well-being outcomes. As one example, it could be poor support and high pressure from the administration, rather than misalignment itself, that undermines well-being. In addition, although there was no evidence that the observed associations depended on whether the misalignment measure was presented before or after the well-being measures, certain measures were presented in fixed order, such as those within the well-being block. Thus, it could be that the pattern of associations was unique to a certain order of presentation. Study 4 was designed to address these limitations by using a new measure of satisfaction and commitment, controlling for a number of potential third variables, and employing greater randomization.

Study 4

Study 4 was designed, as in Study 3, to examine the proposed consequences of misalignment among K-12 teachers—particularly for authenticity, burnout, and overall work satisfaction and commitment. The design was similar to Study 3 except with some refinements to old measures and the addition of several new measures. In particular, a new measure was created to capture two related but distinct components of satisfaction and commitment: that with regards to one's current job and that with regards to teaching itself. I pre-registered the following hypotheses (see https://osf.io/8d4zv/): First, as before, I hypothesized that misalignment would predict lower authenticity and, in turn, greater burnout. In addition, I hypothesized, although with lower confidence, that while misalignment would not predict lower satisfaction and commitment to teaching itself, it would predict lower satisfaction and commitment to one's current job.

Several new measures were also included as potential controls, to test the robustness of misalignment as a predictor of well-being. A better measure of indicator pressure was developed

(see also appendix C) in order to confirm that it is misalignment itself and not just the sense of pressure associated with misalignment that predicts well-being consequences. In addition, three known predictors of teacher well-being were included to explore how misalignment would compare: the use of fair and formative evaluations, administrative support, and low "organizational rigidity"—i.e., an organization that trusts, involves, and empowers teachers (e.g., Brissie, Hoover-dempsey, & Bassler, 2011). I predicted that the associations of misalignment to well-being would hold when controlling for each of these variables. Thus, Study 4 had two main goals building on Study 3: 1) to test for replication with a more rigorous design and 2) to test the independent associations of misalignment to authenticity and burnout, when controlling for indicator pressure and other known predictors of teacher well-being.

Method

Participants and design. In October 2018, individuals who identified their industry in a pre-survey as "education" were recruited in exchange for monetary compensation, using TurkPrime as in Study 3. Following a pre-registered data collection plan, I recruited 250 participants using the new recruitment ad title, "Survey for Current K-12 Teachers." Three participants were not in the intended sample of current K-12 teachers and an additional 14 participants were low quality respondents (i.e., reported being more than "a little" distracted, not taking the study at least "moderately" seriously, or not feeling at least "moderately" comfortable to answer honestly) and were thus excluded.[11] The final sample consisted of 231 teachers (70% female; M_{age} = 35.9 years, SD = 9.6). They had an average of 8.8 years of experience in teaching (SD = 7.0) and were all currently teaching in the United States (43 states represented). Based on

[11] When using a less stringent exclusion criterion, however, none of the analyses presented changed in direction or significance.

calculations made using G*Power (Faul et al., 2007), this final sample provided 93% power to detect a small-to-moderate effect size (r = .20).

Procedure and materials. The survey began similarly to Study 3, with background questions followed by the prompt to identify a self-relevant teaching indicator. Next, they completed two blocks in counter-balanced order. One block included two measures: misalignment (as in Study 3; r = .68) and indicator pressure (detailed below). The other block included the primary well-being measures, this time in randomized order: work authenticity (α = .78), burnout (α = .93), and cognitive deconstruction (detailed in appendix D). Notably, the burnout measure was expanded slightly to 14 items, specifically to include the full emotional exhaustion and depersonalization components (Maslach & Jackson, 1981). Next, participants completed a measure of perceived performance, as in Study 3, followed by a block of new measures, which were presented in random order: the two-component measure of teaching satisfaction and commitment, other known correlates to teacher well-being (detailed below), as well as one additional exploratory measure (detailed in appendix D).[12]

Indicator pressure. The external pressure teachers experience toward indicator outcomes was assessed using three items: "I feel pressured to focus on [indicator]," "My personal career advancement depends on [indicator]," and "When my administration judges how well I'm doing, they put a lot of weight on [indicator]," (α = .78). Participants responded using 6-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Teaching satisfaction and commitment: job-specific and general. Two measures were created to distinguish between satisfaction and commitment to one's current job versus to teaching itself (r = .56). Job-specific satisfaction and commitment was assessed using two items,

[12] Again, none of the analyses presented change in direction or significance when controlling for work performance.

"I am satisfied with my current job, i.e., this particular school and position" and "I am committed to my current job, i.e., this particular school and position" (r = .79). General teaching satisfaction and commitment was assessed using two items, "I am passionate about education" and "I am committed to education" (r = .75). Participants responded to all items on seven-point scales from 1(*strongly disagree*) to 7(*strongly agree*).

Additional factors related to teacher well-being. Drawing heavily on previous research on teacher burnout (Brissie et al., 1988), as well as large-scale assessments of teaching conditions (e.g, Tennessee Educator Survey, 2018), I identified and adapted measures to assess three key factors related to teacher well-being. Participants responded to all items in random order, on six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Fair and formative evaluations. Three items assessed fair and formative evaluations: "In general, the ways I'm evaluated and given feedback are helpful," "The processes used to conduct my teacher evaluation are fair to me," "The feedback I've received is typically focused on helping me improve my teaching (rather than making a judgment about my performance)," (α = .84).

Administrative support. Three items assessed administrative support: "Overall the administration is well-organized and supportive of my classroom," "We have good instructional support at my school," and "We have clear and effective systems within the building, e.g., for handling student discipline problems, arranging logistics," (α = .84).

Organizational rigidity. Three items assessed organizational rigidity: "I have to follow rules at this school that conflict with my best professional judgment," "I have limited involvement in the decisions that affect my work," and, reverse-coded, "There is an atmosphere of trust and mutual respect within my school" (α = .67).

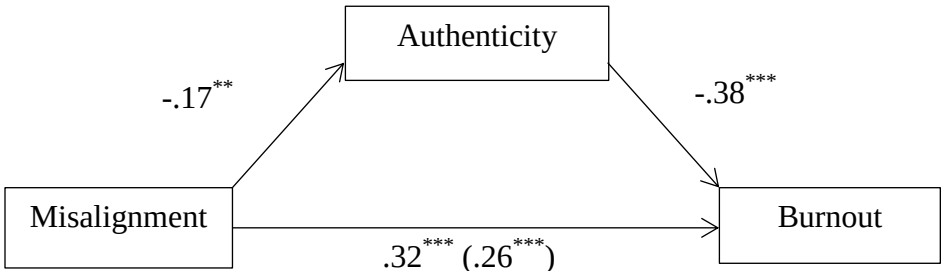
Results

As in Study 3, the majority of participants selected standardized tests as their key teaching indicator (73%), followed by reading level assessments (20%), and other/ self-identified (7%). Also as before, participants reported an average misalignment slightly above "somewhat" misaligned (M = 4.21, SD = 1.28), which was significantly higher than the neutral midpoint, $t(230) = 8.43$, $p < .001$, 95% CI [0.54, 0.87].

Implications of misalignment for well-being and performance. Next, I tested the relationship of misalignment to the primary well-being measures. Misalignment was again related to lower authenticity, $B = -0.11$, $SE = 0.04$, 95% CI [-0.20, -0.03], $t(230) = -2.67$, $p < .008$, $ß = -0.17$; and to higher burnout, $B = 0.34$, $SE = 0.07$, 95% CI [0.21, 0.47], $t(230) = 5.14$, $p < .001$, $ß = 0.32$. I also tested and found, as before, that the relationship of misalignment to burnout was mediated through authenticity. When regressing burnout simultaneously on authenticity and misalignment, authenticity remained a predictor, $B = -0.60$, $SE = 0.09$, 95% CI [-0.78, -0.41], $t(230) = -6.39$, $p < .001$, $ß = -0.37$. Using the bootstrapping method with 10,000 samples (Hayes, 2013), I again found evidence for an indirect path, 95% CI [0.014, 0.013]. See Figure 9 for details.

Figure 9

Association of Misalignment to Burnout via Authenticity (Study 4)



Indirect Effect: 95% Bootstrap CI [0.09, 0.28]

Note. Standardized regression coefficients for the relationship between misalignment and burnout as mediated by authenticity. Bootstrap with 10,000 samples.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

The relations of misalignment to well-being also held when controlling for indicator pressure. Misalignment remained a predictor of authenticity, B = -0.12, SE = 0.05, 95% CI [-0.22, -0.01], t(230) = -2.24, p = .026, ß = -0.17; and burnout, B = 0.28, SE = 0.08, 95% CI [0.12, 0.43], t(230) = 3.54, p < .001, ß = 0.26. In addition, I tested and found no evidence of order effects for any of these measures. There was weak or no evidence that completing misalignment before vs. after the well-being block affected misalignment (B = 0.26, SE = 0.17, 95% CI [-0.07, 0.59], t(230) = 1.55, p =.122, ß = 0.10); work authenticity (B = -0.10, SE = 0.11, 95% CI [-0.32, 0.12], t(230) = -0.92, p = .358, ß = -0.06), or burnout (B = 0.02, SE = 0.18, 95% CI [-0.33, 0.37], t(230) = 0.12, p = .901, ß = 0.01).

Exploratory analyses. Next, I tested the hypotheses involving new measures, which were pre-registered as lower confidence predictions.

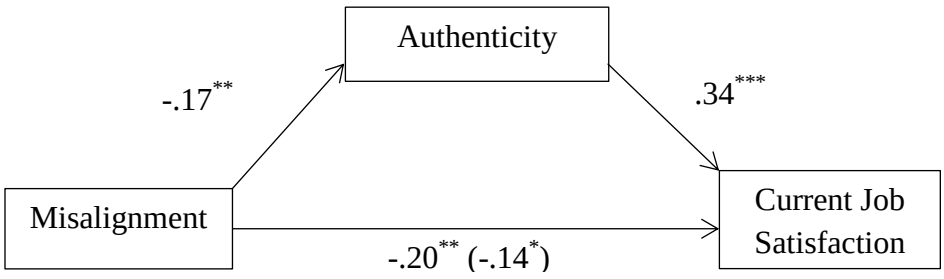
Does misalignment predict lower current job satisfaction and commitment? In separate models, I regressed satisfaction and commitment to education on misalignment as well as satisfaction and commitment to one's current job on misalignment. Mirroring previous findings, there was no evidence that misalignment predicts teachers' satisfaction and commitment to

education itself, B = -0.01, SE = 0.05, 95% CI [-0.11, 0.10], t(230) = -0.12, p = .901, ß = -0.01. As expected, however, misalignment was a negative predictor of teachers' satisfaction and commitment to their current job, B = -0.21, SE = 0.07, 95% CI [-0.34, -0.08], t(230) = -3.13, p = .002, ß = -0.20. When controlling for indicator pressure, though, the evidence became weaker and no longer clearly supported the existence of a relation, B = -0.13, SE = 0.08, 95% CI [-0.29, 0.02], t(230) = -1.68, p = .095, ß = -0.13.

As with burnout, I examined whether this association showed evidence of being mediated through authenticity. When regressing current job satisfaction and commitment simultaneously on authenticity and misalignment, authenticity remained a positive predictor, B = 0.53, SE = 0.10, 95% CI [0.34, 0.72], t(230) = 5.42, p < .001, ß = 0.34. Using the bootstrapping method with 10,000 samples (Hayes, 2013), I found evidence for an indirect path, 95% CI [-0.126, -0.014]. See Figure 10 for details.

Figure 10

Association of Misalignment to Current Job Satisfaction and Commitment via Authenticity (Study 4)



Indirect Effect: 95% Bootstrap CI [0.09, 0.28]

Note. Standardized regression coefficients for the relationship between misalignment and current job satisfaction and commitment as mediated by authenticity. Bootstrap with 10,000 samples.
*p < .05, **p < .01, ***p < .001.

How does misalignment compare to other predictors of teacher well-being? I first tested the correlations of misalignment to the other known correlates of teacher well-being. As seen in

Table 4, misalignment had a small to moderate correlation with each of the known correlates to teacher well-being. Consistent with previous work, each of the known correlates to teacher well-being were also related to burnout (e.g., Brissie et al., 1988), as well as to work authenticity and to current job satisfaction and commitment.

Table 4

Correlations of Misalignment, Known Well-Being Correlates, and Teacher Well-Being (Study 4)

Variables	1	2	3	4	5	6	7
1. Misalignment	-						
2. Fair formative evaluations	-.29***	-					
3. Administrative support	-.14*	.73***	-				
4. Organizational rigidity	.24***	-.36***	-.42***	-			
5. Work authenticity	-.17**	.22**	.21**	-.38***	-		
6. Burnout	.32***	-.38***	-.35***	.44***	-.42***	-	
7. Current job satisfaction	-.20**	.56***	.56***	-.34***	.36***	-.47***	-

Note. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

In order to compare the predictive power of these measures, then, I simultaneously regressed authenticity on all four measures. As seen in Table 5, when tested simultaneously, only organizational rigidity emerged as a clear predictor of authenticity; there was only weak evidence that misalignment was a predictor.

Table 5

Comparing Predictors of Authenticity (Study 4)

Predictor	*B (SE)*	95% CI	*t*	ß
Misalignment	-0.048 (.04)	-0.13, 0.04	-1.11	-.073
Fair and formative evaluations	0.065 (.07)	-0.08, 0.21	0.88	.082
Administrative support	0.001 (.07)	-0.14, 0.14	0.01	.001
Organizational rigidity	-0.236 (.05)	-0.33, -0.14	-4.82***	-.331

Note. Predictors were entered into the regression equation simultaneously.
*$p < .05$, **$p < .01$, ***$p < .001$.

Next, I simultaneously regressed burnout on the same four measures. In contrast to authenticity, the relation of misalignment to burnout held when controlling for the other known predictors (see Table 6). Both misalignment and organizational rigidity emerged as predictors of burnout in the simultaneous model.

Table 6

Comparing Predicators of Burnout (Study 4)

Predictor	*B (SE)*	95% CI	*t*	ß
Misalignment	0.21 (.06)	0.08, 0.33	3.25**	.196
Fair and formative evaluations	-0.19 (.11)	-0.40, 0.03	-1.72†	-.147
Administrative support	-0.11 (.11)	-0.32, 0.10	-0.99	-.085
Organizational rigidity	0.35 (.07)	0.20, 0.49	4.82***	.306

Note. Predictors were entered into the regression equation simultaneously.
†$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.

Lastly, I simultaneously regressed current job satisfaction and commitment on the same four measures. As seen in Table 7, only fair and formative evaluations and administrative support emerged as predictors of job satisfaction and commitment in the simultaneous model.

Table 7

Comparing Predictors of Job Satisfaction and Commitment (Study 4)

Predictor	*B (SE)*	95% CI	*t*	ß
Misalignment	-0.06 (.06)	-0.17, 0.06	-0.95	-.053
Fair and formative evaluations	0.38 (.10)	0.18, 0.57	3.77***	.302
Administrative support	0.36 (.10)	0.17, 0.55	3.66***	.293
Organizational rigidity	-0.11 (.07)	-0.24, 0.02	-1.64	-.097

Note. Predictors were entered into the regression equation simultaneously.
†$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.

Discussion

Study 4 replicated the finding that teachers' misalignment was related to reduced work authenticity and, in turn, to more frequent feelings of burnout. Consistent with Study 3, misalignment did not predict lower satisfaction with education itself; however, this study provided initial evidence that misalignment does predict reduced satisfaction and commitment to one's current job as a teacher. In addition, there was evidence consistent with this association also being mediated through reduced work authenticity. Although more research is needed, these finding are consistent with the possibility that misalignment could be a contributor to turnover problems, i.e., the "revolving door" of teachers. In addition, these findings largely held when controlling for indicator pressure, suggesting that the pressure to focus on an indicator in itself does not generally explain the association of misalignment to well-being.

Not all associations held, however, when controlling for other known correlates to teacher well-being: fair and formative evaluations, administrative support, and organizational rigidity. The association of misalignment to burnout was robust, even when controlling for these variables. The associations of misalignment to work authenticity and to current job satisfaction and commitment, on the other hand, did not hold in this study. In particular, when all four variables were tested as simultaneous predictors, organizational rigidity emerged as the only independent predictor of work authenticity; and fair and formative evaluations and administrative support emerged as the only independent predictors of current job satisfaction and commitment. This was particularly notable in the case of the weaker associations to work authenticity, as this is a central hypothesis and proposed mediator for other well-being consequences. Although it is unclear how to interpret the observed pattern with the present data,

the independent association of misalignment to work authenticity, especially, will require further investigation.

It is not clear that organizational rigidity would always be expected to account for a large part of the shared variance between misalignment and work authenticity, but if so, one possibility is that misalignment and reduced authenticity are both outcomes of organizational rigidity. This will be interesting to test in future work as it may point to a potentially important route of intervention. If organizational rigidity is a cause of misalignment, in addition to a cause of burnout (e.g., Brissie et al., 2011), this could be one place to start in addressing both organizational ailments. Specifically, reducing organizational rigidity means trusting and involving employees more in the decisions that affect their work. Consistent with this recommendation and indeed lending further credence to the arguments of many management science scholars, one often-suggested route to addressing organizational misalignment is to involve stakeholders in the identification of appropriate indicators and goals (e.g., Barsky, 2008; Fryer et al., 2009; Mannion & Braithwaite, 2012; Perrin, 1998). If individual actors are involved in higher-level decision making, they may be more likely to recognize the limitations of the indicator and take responsibility for the underlying goal even in ways the indicator does not address (e.g., Ludwig & Geller, 1997).

While demonstrating again the association of misalignment to well-being, the current set of studies still has several notable methodological limitations. For one, the measure used for misalignment thus far includes only two items and relatively little attention has been given to construct validation—a common but important limitation in much social psychological research (Flake, Pek, & Hehman, 2017). Further, no studies have yet analyzed the full proposed model, including both antecedents and consequences, or tested how these various factors play out over

time. The current causal ambiguity regarding the association of misalignment and authenticity is but one example of how a longitudinal approach could provide further insights to the mechanisms involved in misalignment. Study 5 aimed to address these limitations, using an expanded, pre-tested measure of misalignment as well as a two-part longitudinal design.

Study 5

Study 5 was a longitudinal study, designed to assess both the proposed antecedents to and consequences of misalignment with a new indicator and context: specifically, investigating the pursuit of publication count among graduate students in Psychology. As discussed earlier, misalignment is also an important and well-documented problem within academia, particularly due to the prominent focus on publication (Osterloh, 2010)—which is exemplified most clearly in the use of questionable research practices to maximize output even at the cost of scientific integrity (e.g., Janke et al., 2018; John et al., 2012). The notoriously low well-being of graduate students, as with K-12 teachers, also makes it an especially important context to study well-being outcomes. A recent global study found, across many fields of study, that graduate students were more than six times as likely to experience depression and anxiety as compared to the general population (Evans, Bira, Gastelum, Weiss, & Vanderford, 2018).

Study 5 therefore assessed several workplace well-being measures—authenticity, meaning and engagement in work, overall satisfaction and belonging in graduate school—as well as potential downstream consequences for graduate students' overall well-being: life satisfaction, depression, and anxiety.[13] In addition, Study 5 included the proposed antecedents of ASCI, graduate self-image goals, and perceived publication social value—as well as several new

[13] Note that burnout, one of the key dependent variables in Studies 3 and 4, is specifically intended to capture emotional difficulties that occur in human services like education and medicine. This was not of primary interest in the current context of academia, but an exploratory one-item measure was nonetheless included for comparison (see appendix E).

exploratory measures. For one, as publishing is instrumental to getting a job, I predicted that anxiety about one's ability to get a research-focused job would predict greater misalignment. Given that misalignment can occur unintentionally as well (Study 2), I was interested in factors that could contribute to misalignment simply by failing to recognize one's motives or pattern of behaviors as being misaligned. In this vein, I predicted that low mindfulness (Brown & Ryan, 2003), low goal clarity, and high goal conflict would be strong candidates for antecedents to misalignment. Similarly, another relatively unintentional route may be related to need for closure (Webster & Kruglanski, 1994). Those high in need for closure may be especially likely to latch onto indicators as a definitive assessment of their performance (disliking the ambiguity of more holistic evaluations), thus leading to greater misalignment.

In addition, Study 5 also included intentional indicator priority, as in Study 2, as well as two measures with close conceptual relation to misalignment in the psychological literature, to test for discriminant validity. First, I assessed the self-concordance of publication, a measure rooted in self-determination theory—i.e., the degree to which publishing feels intrinsically motivated or pursued as an end in and of itself vs. extrinsically motivated or pursued for external, separable ends (e.g., Ryan & Deci, 2000; Sheldon & Elliot, 1991). Similar to the hypotheses for misalignment, extrinsic motivation can also be caused by the awareness of being evaluated by others (Deci & Ryan, 1980; Ryan, Mims, & Koestner, 1983) and, in turn, is related to lower well-being across a variety of measures e.g., mood, life satisfaction. Similarly, evaluative concerns are also central to performance orientation (e.g., Dweck & Leggett, 1988; Elliott & Dweck, 1988)—a goal orientation directed towards gaining positive judgments as opposed to learning or gaining competence—and this, too, can lead to negative affect. Given the conceptual

overlap, then, it was important to test whether the proposed antecedents and consequences would hold when controlling for these variables.

All of these measures were assessed at the end of fall term and all, with the exception of trait measures, were assessed again in the middle of the following spring term. This provided the opportunity to test the proposed associations to misalignment at two time points, as well as to test the association of changes in proposed antecedents to changes in misalignment; and similarly, the association of changes in misalignment to changes in proposed consequences. Although this design does not permit clear causal claims, this design still went beyond the previous cross-sectional data to provide a better picture of how misalignment develops over time.

Method

Participants and design. 300 upper-year Psychology graduate students were recruited for an online survey (our Time 1 assessment) in exchange for a five-dollar Amazon.com gift card. This was accomplished by creating a directory of ~3000 Psychology graduate student e-mail addresses from public listings provided on university webpages—including 60 universities in 40 different states in the United States. In late November and early December 2018, two waves of recruitment messages were sent using these addresses, requesting participation from second-year students and above. In wave one, as the university listings varied dramatically in size, I used a quasi-random selection to promote diverse university representation: first, five students from each university were randomly selected (300 in total) and then an additional 600 were selected fully at random. Having not yet reached the quota ten days later at the conclusion of wave one, I randomly selected and e-mailed another 300 students in wave two. In sum, 1200 recruitment messages were sent, which yielded at least a 26% response rate for successfully-sent messages (given the 39 addresses confirmed invalid, e.g., first-year students, bounced).

Of the 300 participants recruited, 19 were not in the intended sample of current full-time graduate students and data for one participant was lost due to a technical error, leaving 280 participants for Time 1 analyses (73.2% female, 25.0% male, 1.1% non-binary; M_{age} = 28.1 years, SD = 4.1; 67.9% Non-Hispanic White, 9.6% East Asian, 8.2% mixed racial background, 4.3% Hispanic, 3.6% Black, 2.5% South Asian, and 2.5% other). A broad range of Psychology areas were represented: 27.5% clinical, 20.0% cognitive and/or neuroscience, 25.7% social and/or personality, 17.5% developmental, 3.2% industrial/ organizational, and 13.6% other. They also had a roughly even spread of experience in graduate school: 21-23% in each year from second to fifth and 11% in sixth-year or above. Based on calculations made using G*Power (Faul et al., 2007), this sample provided 96% power to detect a small-to-moderate association (r = .20), i.e., for bivariate correlations.

The Time 2 survey took place three months later, in March 2019, and was also in exchange for a five-dollar Amazon gift card. Despite strong interest expressed in the follow-up (96%), only 147 of the 280 valid Time 1 participants completed the Time 2 survey, i.e., 53% retention. An additional 12 were no longer full-time graduate students at Time 2 (e.g., recently graduated), leaving 135 participants for Time 2 analyses. Lastly, 11 ID numbers (used to link data between the two time points) were lost or presumed incorrect due to mismatched demographics, leaving 124 participants for the full longitudinal analyses. In order to detect a small-to-moderate association (r = .20), this sample nonetheless provided 77% power for the Time 2 analyses and 73% power for the longitudinal analyses.

There were some observed differences between Time 1 participants who followed through with Time 2 and those who did not, but no compelling evidence for differences in misalignment, $t(277) = -1.45$, $p = .148$, 95% CI [-0.36, 0.06]. Specifically, confirmed Time 2

participants (vs. non-confirmed) were higher at Time 1 in certain aspects of well-being: they reported higher authenticity, $t(278) = 2.01$, $p = .046$, 95% CI [0.01, -0.49]; higher mentorship satisfaction $t(278) = 2.22$, $p = .013$, 95% CI [0.05, 0.77]; higher overall graduate school satisfaction ($t(278) = 2.27$, $p = .024$, 95% CI [0.04, 0.57]; lower job anxiety ($t(278) = -2.04$, $p = .043$, 95% CI [-0.52, -0.01]; and lower belonging uncertainty, $t(278) = 8.43$, $p < .001$, 95% CI [-0.87, -0.54]. There were no significant differences in any other variables measured.

Procedure and materials. In the Time 1 survey, participants completed initial background questions about their graduate program followed by four blocks in random order: one assessing misalignment and closely-related constructs, one assessing trait-level proposed antecedents to misalignment, one assessing state-level proposed antecedents to misalignment, and one assessing proposed well-being outcomes. The Time 2 survey was identical in structure and content except that it omitted measures that were presumed stable, i.e., the trait-level antecedent block and most background questions, and also added one final page about publication count. Participants were asked about their own number of papers (in prep, under review, and published) as well as the number of publications they think is average for a student at their stage. All other measures with the exception of a few exploratory single-item measures (detailed in appendix E) are described below—and were self-generated unless otherwise noted.

Trait-level antecedent block (Time 1 only). Participants completed four established scales in random order: attention to social comparison information (Lennox & Wolfe, 1984), mindful attention and awareness (Brown & Ryan, 2003), need for closure (Webster & Kruglanski, 1994; Roets & Van Hiel, 2011), and performance orientation (Jha & Bhattacharyya, 2013). For brevity, each scale was limited to six items, selected based on their high inter-item correlations and correlations to grade-misalignment in a pilot study.

State-level antecedent block. Participants completed measures of proposed state-level antecedents to misalignment in random order (detailed below).

Graduate self-image goals. Similar items were used to assess self-image goals as in previous studies, but adapted in this case to graduate school. The measure began with the prompt, "In graduate school, how much do you…" followed by six items (adapted from Crocker, Olivier, & Nuer, 2009; and Kruglanski et al., 2013), e.g., "try to avoid coming across as unintelligent or incompetent," and "try to get others to respect or admire you" (α = .77 at Time 1 and α = .78 at Time 2). Participants responded using five-point scales from 1(*not at all*) to 5(*extremely*).

Publication social value. A slightly different operationalization of perceived indicator social value was used in this context. Specifically, participants rated the importance of publication for four social outcomes: "your social status (i.e., your relative social and professional standing in grad school)", "how your peers evaluate you", "how the faculty in your area evaluate you", and "how your potential employers will evaluate you." They responded using five-point scales from 1(*not at all important*) to 5(*extremely important*). At both time points, the scale had improved internal reliability when removing the value-for-employment item. "Publication employment value" was thus removed and analyzed separately (3-item "publication social value" scale α = .72 at Time 1 and α = .77 at Time 2).

Job anxiety. Two items assessed anxiety about successfully attaining a research-focused academic job: "I feel (or would feel) anxious about my chances of getting a research-focused academic job after graduation" and, reverse-coded, "I feel (or would feel) optimistic about the job market and my ability to get a research-focused academic job" (r = .47 at Time 1 and r = .57

at Time 2). Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).[14]

Goal clarity. Two items assessed goal clarity: "I have a clear sense of my values and priorities as a graduate student" and "I have a clear sense of how to evaluate myself as a graduate student" (r = .57 at Time 1 and r = .54 at Time 2). Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

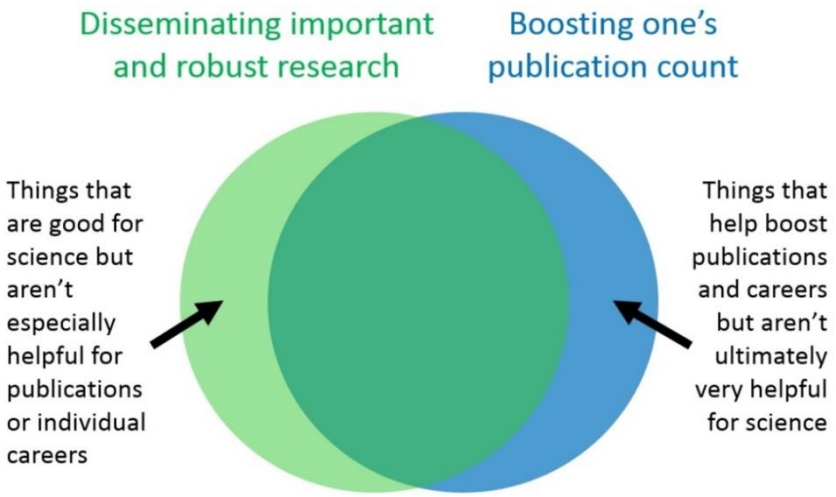
Goal conflict. Two items assessed goal conflict: "My priorities in graduate school often conflict with one another" and "The priorities others have for me (e.g., my mentor) differ from my own" (r = .43 at Time 1 and r = .52 at Time 2). Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Misalignment block. In this block, participants completed three subsections in random order: misalignment, intentional indicator priority, and publication self-concordance.

Misalignment. In the misalignment subsection, participants first read an introduction, with the following text and illustration:

> Publication count is one indicator of a person's scientific contribution and potential. Indeed, publishing is a key part of how we contribute to science. Yet, a person purely focused on performance indicators (e.g., publication) and one purely focused on science may not always have the same approach. There are some things we do which prioritize one more than the other. Please take a moment to consider the depiction below.

[14] In the initial background questions, participants were asked the extent to which they were interested in a research-focused academic career. The mode was "very much" interested at both time points and the majority of participants reported at least a "moderate" interest: 73% at Time 1 and 68% at Time 2. Further, the association of job anxiety to misalignment was not qualified by an interaction with one's interest in a research-focused academic career at either time point: B = -0.03, SE = 0.05, 95% CI [-0.13, 0.07], $t(278)$ = -0.60, p = .547, ß = -0.04 for Time 1 and B = -0.08, SE = 0.06, 95% CI [-0.20, 0.04], $t(136)$ = -1.38, p =.170, ß = -0.12 for Time 2. In other words, there was no evidence that the association of job anxiety to misalignment depends on one's level of interest in a research career.



After the introduction, participants completed a six-item misalignment scale, e.g., "Sometimes I get narrowly focused on publication—thus neglecting activities with less immediate or visible impact"; "My efforts to boost publications and advance my career are inconsistent at times with purely scientific values" (α = .78 at Time 1 and α = .80 at Time 2). Participants responded on six-point scales from 1(*strongly disagree*) to 6(*strongly agree*). I pilot-tested this scale (and introduction) to ensure that it was clear to graduate participants and that the items had good internal reliability and predictive validity. For more details on the pilot study and full scale items, see appendix F.

On the next and last page of this subsection, participants responded to three brief follow-up measures about the misalignment scale they had just completed, using the same scale as above. Two items assessed misalignment awareness, e.g., reverse-scored, "These items prompted me to think about something that I'm not always aware of" (r = .78 at Time1 and r = .74 at Time 2). Two items assessed misalignment norms, e.g., "It's the norm to focus narrowly on performance measures like publication count" (r = .32 at Time 1 and r = .34 at Time 2). Lastly, two items assessed misalignment importance, e.g., "It's important to me that I reflect on these kind of questions" (r = .64 at Time 1 and r = .65 at Time 2).

Intentional indicator priority. In this subsection, participants completed one two-item measure, similar to that in Study 2. This adaptation began with the introduction: "Although the pursuit of publications (e.g., to advance your career) and science (e.g., to disseminate important and robust research) may usually be complementary, we are interested in which you value more strongly to the extent that they do differ." Participants were then prompted, "Given the situational pressures, which matters more to you at this stage: getting more publications or contributing to science?" to which they responded on seven-point scales from 1(*publications matter much more*) to 7(*science matters much more*). Secondly, participants were prompted, "Given the situational pressures, which do you intend to pursue more strongly at this stage?" to which they responded on seven-point scales from 1(*publication much more*) to 7(*science much more*) (r = .76 at Time 1 and r = .73 at Time 2).

Publication self-concordance. In this subsection, participants completed items from an established scale (Sheldon & Elliot, 1999), which were adapted to the activity of working toward publication. Participants responded to four items which were designed to assess motivations to publish on the spectrum from fully intrinsic to fully extrinsic: "Working toward publications brings me fun and enjoyment"; "I genuinely believe working toward publications is an important goal to have"; "I would feel guilty for not working toward publications"; "Someone else wants me to work toward publications or the situation demands it." Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*). Self-concordance scores were calculated by adding the first two items and subtracting the second two items (e.g., Judge, Erez, Bono, & Locke, 2005; Sheldon & Elliot, 1999).

Well-being block. Participants completed measures of workplace well-being and of overall well-being in random order. For simplicity, the workplace well-being measures—

authenticity, meaning, engagement, graduate school satisfaction, and belonging uncertainty (reverse-scored)—were also analyzed as a composite (α = .83 at Time 1 and α = .83 at Time 2).[15]

Work authenticity. The assessment of authenticity at work, as in Studies 4 and 5, was an adaptation of the Wood et al. scale (2008). Following the prompt, "How would you characterize your current experience in your graduate program?" participants rated eight items, e.g., "I am true to myself in most situations," using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*). Two items from the "accepting external influence" subscale hung together poorly with the rest at both time points and were thus removed and analyzed separately (six-item scale α = .88 at Time 1 and α = .89 at Time 2).[16]

Work meaning and engagement. Three items from the work engagement scale (Schaufeli & Bakker, 2004) assessed the frequency of experiencing meaning in work, e.g., "I find the work that I do full of meaning and purpose" (α = .88 at Time 1 and α = .90 at Time 2). Two items from the same scale assessed the frequency of engagement, e.g., "I am immersed in my work" (r = .61 at Time 1 and r = .60 at Time 2). Participants rated each item on a six-point scale from 1(*almost never*) to 6(*almost always*).

Grad school satisfaction. Participants rated their satisfaction with their "graduate school experience as a whole" using a six-point scale from 1(*very dissatisfied*) to 6(*very satisfied*).

Belonging uncertainty. Two items assessed graduate school belonging uncertainty (adapted from Walton & Cohen, 2007): "When something bad happens, I feel that maybe I don't belong in my program" and "Sometimes I doubt my commitment to finishing my program" (r =

[15] None of the analyses using this composite change in direction or significance when also including the single-item burnout measure (detailed in appendix E) in the composite.
[16] The reported analyses do not change in direction or significance when using the full authenticity scale.

.53 at Time 1 and r = .49 at Time 2). Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Life satisfaction. Participants rated their satisfaction with their "life as a whole" (Cheung & Lucas, 2014), using a six-point scale from 1(*very dissatisfied*) to 6(*very satisfied*).

Depression and anxiety. Four items from the Depression, Anxiety and Stress Scale (Lovibond & Lovibond, 1995) assessed symptoms of depression, e.g., "I felt that life was meaningless" and "I found it difficult to work up the initiative to do things" (α = .73 at Time 1 and α = .74 at Time 2). Three items, drawing from the same scale, assessed symptoms of anxiety, e.g., "I found myself getting agitated" and "I found it difficult to relax" (α = .71 at Time 1 and α = .76 at Time 2). Participants responded about how they felt over the past week using four-point scales from 1(*did not apply to me at all*) to 4(*applied to me very much or most of the time*).

Results

Descriptive statistics and associations to conceptually-related variables. I first examined the descriptive levels of misalignment and conceptually related measures at Time 1. On average, participants reported being somewhat aligned (M = 2.91, SD = 0.88), which was lower than the neutral midpoint of misalignment, $t(279) = -11.12$, $p < .001$, 95% CI [-0.69, -0.48]. When choosing between publication for its own sake and scientific contribution, however, participants did report a slight priority of publication on average (M = 4.34, SD = 1.64), $t(279) = 3.50$, $p = .001$, 95% CI [0.15, 0.54]. As well, they reported being somewhat aware of misalignment (M = 3.63, SD = 1.26)—and perceived the norm to be misalignment (M = 4.70, SD = 0.81), which was well above the neutral midpoint, $t(278) = 14.49$, $p < .001$, 95% CI [0.61, 0.80]. Lastly, participants reported feeling that reflecting on misalignment is important (M = 5.27, SD = 0.74).

Comparing Time 1 and Time 2, I found that participants became more misaligned over the three-month period, $t(122) = 2.34$, $p = .021$, 95% CI [0.03, 0.29]; nonetheless, the mean was still below the midpoint at Time 2, descriptively closest to "somewhat" aligned (M = 2.99, SD = 0.87). Notably, there were no changes over time in any of the other conceptually-related variables. At Time 2, alone, I was also able to examine personal and perceived normative publication counts. Interestingly, participants believed that other graduate students at their stage had more publications (M = 3.36, SD = 2.25; median = 3; mode = 2) compared to the actual average publication count in the sample (M = 2.79, SD = 3.42; median = 1.5, mode = 0), $t(135) = -2.19$, $p = .030$, 95% CI [-1.08, -0.05], displaying what appears to be a pluralistic ignorance about publications in graduate school (e.g., Prentice & Miller, 1993).

Next, I examined the correlations between misalignment and each of the conceptually-related variables. As expected, misalignment was related to intentional indicator priority at Time 1 ($r = .42$, $p < .001$) and Time 2 ($r = .30$, $p < .001$). Additionally, perceiving misalignment to be normative was related to one's own misalignment at Time 1 ($r = .20$, $p < .001$) and possibly related at Time 2 ($r = .16$, $p = .071$). There was no evidence that misalignment awareness and misalignment importance were related to misalignment at Time 1 ($r = -.01$, $p = .932$ and $r = .01$, $p = .925$ respectively); and a similar lack of association was observed at Time 2. Notably, however, publication self-concordance was negatively related to misalignment at both Time 1 ($r = -.20$, $p < .001$) and Time 2 ($r = -.30$, $p < .001$). In addition, while performance orientation (measured at Time 1) was not clearly related to misalignment at Time 1($r = .09$, $p = .121$), it was related to misalignment at Time 2 ($r = .22$, $p = .015$).[17]

[17] Due to the correlation of misalignment with publication self-concordance, all analyses were repeated while controlling for this measure. Additionally any analyses including Time 2 data were repeated controlling for

Testing the proposed antecedents to misalignment. I began, next, to examine the primary hypotheses, starting with the proposed antecedents to misalignment. As seen in Tables 8 and 9, ASCI and publication social value were related to misalignment at both time points. In addition, self-image goals were only weakly related to misalignment at Time 1 (r = .11, p = .059) but related more clearly at Time 2. Notably though, in the Time 2 analyses, when controlling for publication self-concordance, the correlation of ASCI (measured at Time 1) and self-image to misalignment became weaker: r = .13, p = .144 and r = .16, p = .081 respectively. Similar effects were observed in Time 2 analyses when controlling for performance orientation. All relations held, however, when controlling for intentional indicator priority at both time points. Lastly, there was no evidence at either time point that perceived publication employment value was related to misalignment.

Table 8

Correlations of Misalignment to Primary Proposed Antecedents (Study 5, Time 1)

Variables	1	2	3	4	5
1. Misalignment	-				
2. ASCI	.21***	-			
3. Grad self-image goals	.11†	.40***	-		
4. Publication social value	.19**	.14*	.26***	-	
5. Publication employment value	.09	-.02	.13*	.33***	-

Note. †p < .10, *p < .05, **p < .01, ***p < .001

performance orientation. Lastly, as in Study 2, all analyses with proposed antecedents were repeated while controlling for intentional indicator priority. Any observed changes in significance are noted in text.

Table 9

Correlations of Misalignment to Primary Proposed Antecedents (Study 5, Time 2)

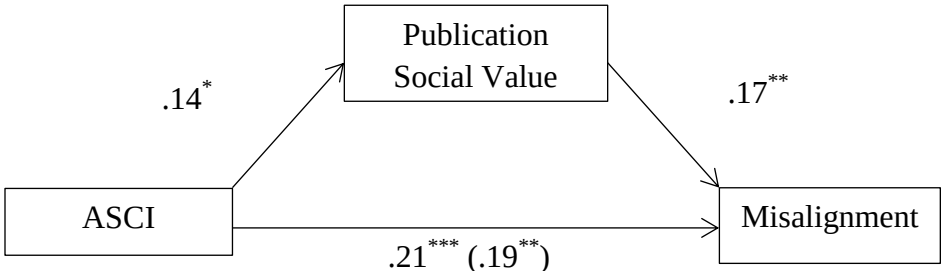
Variables	1	2	3	4	5
1. Misalignment	-				
2. ASCI (Time 1)	.20*	-			
3. Grad self-image goals	.24**	.49***	-		
4. Publication social value	.19*	.14	.32***	-	
5. Publication employment value	.02	-.17†	.06	.25**	-

Note. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

Next, I tested the mediation models of chronic evaluative concerns predicting indicator social value and, in turn, greater misalignment (see also Studies 1 and 2). First, I examined these models in the Time 1 data. Using the bootstrapping method with 10,000 samples (Hayes, 2013), I tested and found an indirect path of ASCI to misalignment through publication social value, 95% CI [0.003, 0.065]. See Figure 11 for details.

Figure 11

Association of Attention to Social Comparison Information to Misalignment via Publication Social Value (Study 5, Time 1)



Indirect Effect: 95% Bootstrap CI [0.003, 0.065]

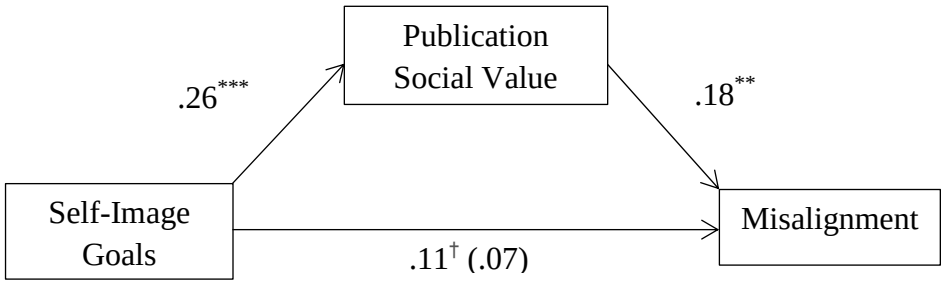
Note. Standardized regression coefficients for the relationship between attention to social comparison information and misalignment as mediated by publication social value. Bootstrap with 10,000 samples. *$p < .05$, **$p < .01$, ***$p < .001$.

Although self-image goals were only weakly related to misalignment at Time 1, I also

found an indirect path from self-image goals to misalignment through publication social value at Time 1, 95% CI [0.016, 0.117]. See Figure 12 for details.

Figure 12

Association of Self-Image Goals to Misalignment via Publication Social Value (Study 5, Time 1)



Indirect Effect: 95% Bootstrap CI [0.016, 0.117]

Note. Standardized regression coefficients for the relationship between self-image goals and misalignment as mediated by publication social value. Bootstrap with 10,000 samples.
$^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Examining these models at Time 2, however, did not yield clear evidence for indirect paths. Using the bootstrapping method with 10,000 samples (Hayes, 2013), there was no clear indirect path of ASCI to misalignment through publication social value at Time 2, 95% CI [-0.004, 0.101]. Similarly, there was no clear evidence for the indirect path from self-image goals to misalignment through publication social value at Time 2, 95% CI [-0.016, 0.163].

I next examined the lower-confidence predictions for antecedents to misalignment. As seen in Tables 10 and 11, higher goal conflict and lower goal clarity were related to misalignment at both time points. In addition, mindfulness (measured at Time 1) was related to misalignment at Time 2. Notably though, when controlling for publication self-concordance, the associations observed at Time 1 did not hold; and, when controlling for intentional indicator priority, all except the association of goal conflict to misalignment did not hold. In contrast the associations at Time 2 were more robust, with the exception of the correlation of mindfulness to misalignment which became less clear when controlling for self-concordance (r = -.17, p = .056)

or performance orientation. There was no clear evidence that either job anxiety or need for closure was related misalignment at either time point.

Table 10

Correlations of Misalignment to Exploratory Antecedents (Study 5, Time 1)

Variables	1	2	3	4	5	6
1. Misalignment	-					
2. Job anxiety	.11†	-				
3. Goal conflict	.14*	.21***	-			
4. Goal clarity	-.12*	-.23***	-.22***	-		
5. Mindfulness	-.09	-.06	-.23***	.10	-	
6. Need for closure	-.01	.23***	.21***	-.12*	-.23***	-

Note. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Table 11

Correlations of Misalignment to Exploratory Antecedents (Study 5, Time 2)

Variables	1	2	3	4	5	6
1. Misalignment	-					
2. Job anxiety	.09	-				
5. Goal conflict	.29**	<.01	-			
6. Goal clarity	-.24**	-.26**	-.20*	-		
7. Mindfulness (Time 1)	-.23*	.03	-.18*	.21*	-	
8. Need for closure (Time 1)	.10	.16†	.04	.04	-.30**	-

Note. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Longitudinal analyses on the proposed antecedents to misalignment. Turning next to analyses across both time points, I began by testing the association between proposed antecedents and the change in misalignment over time. First, I regressed Time 2 misalignment on

Time 1 misalignment and Attention to Social Comparison Information. There was only mixed evidence of ASCI as a predictor of the change in misalignment, B = 0.11, SE = 0.07, 95% CI [-0.04, 0.26], t(122) = 1.43, p = .155, ß = 0.11.

For each of the state variables, then, I simultaneously regressed Time 2 misalignment on Time 1 misalignment and both time points of the variable of interest. Using this approach, change in graduate self-image goals (measured as Time 2 self-image goals controlling for Time 1 self-image goals) did not provide clear evidence of being a predictor of the change in misalignment, B = 0.17, SE = 0.13, 95% CI [-0.09, 0.44], t(122) = 1.28, p = .202, ß = 0.14. Increased publication social value, however, was a predictor of increased misalignment, B = 0.18, SE = 0.09, 95% CI [0.01, 0.36], t(122) = 2.07, p = .041, ß = 0.18. When also controlling for self-concordance at both time points, however, increased publication social value only provided mixed evidence of predicting increased misalignment, B = 0.16, SE = 0.09, 95% CI [-0.02, 0.33], t(122) = 1.77, p =.079, ß = 0.15. Similar effects were observed when controlling for performance orientation and intentional indicator priority.

Using the same analytical approach as above, I examined the association of changes in each of the lower-confidence antecedents to changes in misalignment. Change in job anxiety was not a predictor of changes in misalignment, B = 0.03, SE = 0.07, 95% CI [-0.11, 0.16], t(122) = 0.43, p = .671, ß = 0.04. Increased goal conflict, however, did predict increased misalignment, B = 0.21, SE = 0.08, 95% CI [0.06, 0.36], t(122) = 2.73, p = 0.007, ß = 0.26; and increased goal clarity predicted reduced misalignment, B = -0.26, SE = 0.09, 95% CI [-0.44, -0.08], t(122) = -2.90, p = .005, ß = -0.26. In addition, mindfulness (measured at Time 1) predicted reduced misalignment, B = -0.21, SE = 0.07, 95% CI [-0.35, -0.07], t(122) = -2.94, p = 0.004, ß = -0.21, and need for closure (measured at Time 1) predicted increased misalignment, B = 0.15, SE =

0.07, 95% CI [0.01, 0.30], $t(122) = 2.07$, $p = .041$, $ß = 0.15$. When controlling for self-concordance at both time points (or performance orientation), need for closure no longer predicted changes in misalignment; all other relations held.

Lastly, for state variables, another potentially informative approach is to do cross-lagged analyses, i.e., testing whether Time 1 proposed antecedents, alone, predict changes in misalignment—as well as vice versa to see if the opposite causal direction is supported. Using this approach, there was only mixed evidence that Time 1 publication social value predicted increased misalignment, $B = 0.11$, $SE = 0.08$, 95% CI [-0.04, 0.26], $t(122) = 1.40$, $p = .163$, $ß = 0.11$. Testing the reverse, there was no evidence that Time 1 misalignment was associated with increased publication social value, $B = -0.06$, $SE = 0.08$, 95% CI [-0.22, 0.1], $t(122) = -0.70$, $p = .485$, $ß = -0.05$. There was no support for Time 1 goal conflict predicting changes in misalignment or vice versa; nor was there support for Time 1 goal clarity predicting changes in misalignment or vice versa.

Testing the proposed consequences of misalignment. I next examined the correlations of misalignment to proposed well-being outcomes. First, examining the measures of well-being at work, misalignment was indeed negatively related to the composite of workplace well-being at Time 1 ($r = -.15$, $p = .012$) and Time 2 ($r = -.29$, $p = .001$). This association did not hold when controlling for publication self-concordance at Time 1 ($r = -.07$, $p = .251$), but was robust at Time 2. As seen in Table 12, when testing the measures individually, Time 1 misalignment was related to work authenticity, meaning, and engagement. Each only showed weak evidence of a relation, however, when controlling for publication self-concordance: authenticity ($r = -.11$, $p = .061$), meaning ($r = -.10$, $p = .098$), engagement ($r = -.11$, $p = .073$). At Time 2, the associations to workplace well-being were stronger and there was also evidence that misalignment was

associated to overall graduate school satisfaction (see Table 13). Certain associations still became weaker, however, when controlling for publication self-concordance at Time 2: work meaning (r = -.16, p = .062), engagement (r = -.13, p = .139), and grad school satisfaction (r = -.14, p = .104). All correlations held when controlling for performance orientation.

Table 12

Correlations of Misalignment to Workplace Well-Being (Study 5, Time 1)

Variables	1	2	3	4	5	6
1. Misalignment	-					
2. Authenticity	-.17**	-				
3. Meaning	-.17**	.59***	-			
4. Engagement	-.17**	.43***	.63***	-		
5. Grad school satisfaction	-.05	.55***	.53***	.42***	-	
6. Belonging uncertainty	.05	-.51***	-.44***	-.36***	-.45***	-

Note. *p < .05, **p < .01, ***p < .001

Table 13

Correlations of Misalignment to Workplace Well-Being (Study 5, Time 2)

Variables	1	2	3	4	5	6
1. Misalignment	-					
2. Authenticity	-.37***	-				
3. Meaning	-.27**	.58***	-			
4. Engagement	-.21*	.40***	.61***	-		
5. Grad school satisfaction	-.21*	.57***	.45***	.35***		
6. Belonging uncertainty	.11	-.60***	-.45***	-.37***	-.39***	-

Note. *p < .05, **p < .01, ***p < .001

I also tested the association of misalignment to the measures of overall well-being. As seen in Table 14, misalignment was unrelated to these measures at Time 1. At Time 2, however, as seen in Table 15, misalignment was related to lower life satisfaction. When controlling for self-concordance, the association to life satisfaction became less clear (r = -.12, p = .168). When controlling for performance orientation, the relation held.

Table 14

Correlations of Misalignment to Overall Well-Being (Study 5, Time 1)

Variables	1	2	3	4
1. Misalignment	-			
2. Life satisfaction	-.07	-		
3. Depression	-.04	-.48***	-	
4. General anxiety	-.04	-.29***	.48***	-

Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Table 15

Correlations of Misalignment to Overall Well-Being (Study 5, Time 2)

Variables	1	2	3	4
1. Misalignment	-			
2. Life satisfaction	-.20*	-		
3. Depression	.13	-.17*	-	
4. General anxiety	.16†	-.13	.54***	-

Note. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Longitudinal analyses on the proposed consequences of misalignment. Again, turning to analyses across both time points, I examined the association of misalignment to changes in workplace well-being over time. Simultaneously regressing the Time 2 workplace well-being composite on the Time 1 workplace well-being composite and both time points of misalignment, I found that increased misalignment was indeed a predictor of reduced workplace well-being, *B*

= -0.27, *SE* = 0.06, 95% CI [-0.40, -0.14], *t*(122) = -4.19, *p* < .001, ß = -0.28. Completing the same analyses for each workplace well-being measure individually, then, increased misalignment was a predictor of reduced authenticity, *B* = -0.24, *SE* = 0.08, 95% CI [-0.40, -0.08], *t*(122) = -2.92, *p* = .004, ß = -0.22. Similarly, increased misalignment was a predictor of reduced meaning in work, *B* = -0.35, *SE* = 0.09, 95% CI [-0.53, -0.17], *t*(122) = -3.85, *p* < .001, ß = -0.28; reduced engagement in work, *B* = -0.26, *SE* = 0.10, 95% CI [-0.47, -0.06], *t*(122) = -2.55, *p* = .012, ß = -0.23; and reduced overall satisfaction with graduate school, *B* = -0.38, *SE* = 0.11, 95% CI [-0.59, -0.16], *t*(122) = -3.45, *p* = .001, ß = -0.29. Changes in misalignment did not provide clear evidence of predicting belonging uncertainty, *B* = 0.17, *SE* = 0.12, 95% CI [-0.06, 0.39], *t*(122) = 1.45, *p* = .149, ß = 0.11.

Using the same approach to test the association of misalignment to changes in overall well-being, increased misalignment was a predictor of reduced life satisfaction, *B* = -0.36, *SE* = 0.12, 95% CI [-0.6, -0.12], *t*(122) = -2.99, *p* = .003, ß = -0.25. Changes in misalignment, however, provided only mixed evidence of predicting changes in depression, *B* = 0.08, *SE* = 0.07, 95% CI [-0.05, 0.22], *t*(122) = 1.25, *p* = .214, ß = 0.12, and changes in general anxiety, *B* = 0.13, *SE* = 0.09, 95% CI [-0.04, 0.30], *t*(122) = 1.48, *p* = .143, ß = 0.14. Notably, the evidence for the observed associations to all proposed well-being outcomes remained essentially the same when retesting each of these models controlling for self-concordance (at both time points) as well as when controlling for performance orientation.

Again, as a follow-up, I also examined the data using a cross-lagged approach. In these analyses, there was no evidence that Time 1 misalignment predicted changes in the composite of workplace well-being, *B* = -0.03, *SE* = 0.06, 95% CI [-0.15, 0.08], *t*(122) = -0.59, *p* = .558, ß = -0.03; nor that Time 1 workplace well-being predicted changes in misalignment, *B* = -0.08, *SE* =

0.07, 95% CI [-0.22, 0.07], $t(177) = -1.05$, $p = .295$, $ß = -0.08$. Notably, though, there was high stability in workplace well-being from Time 1 to Time 2 ($r = .79$, $p < .001$), so there was relatively little remaining variance to be explained. When analyzing individual well-being items, the same pattern of null findings was generally obtained—with two notable exceptions. Time 1 authenticity predicted reduced misalignment, $B = -0.14$, $SE = 0.07$, 95% CI [-0.271, -0.002], $t(122) = -2.02$, $p = 0.046$, $ß = -0.15$; and Time 1 misalignment predicted marginally increased depression, $B = 0.10$, $SE = 0.06$, 95% CI [-0.01, 0.21], $t(122) = 1.75$, $p = .083$, $ß = 0.13$, and anxiety, $B = 0.13$, $SE = 0.07$, 95% CI [-0.01, 0.28], $t(122) = 1.81$, $p = .073$, $ß = 0.14$.

Testing full models: from proposed antecedents to consequences. Lastly, I also analyzed full models—including both antecedents and consequences. To limit the number of analyses and likelihood of type-I error, I focused only on the composite of workplace well-being as the proposed outcome. For each of the proposed antecedents that emerged as predictors of misalignment, then, I tested for evidence consistent with a direct effect of these variables on workplace well-being, as well as for an indirect path from each of these variables to workplace well-being through misalignment.

Consistent with a possible direct effect, ASCI, graduate self-image goals, goal conflict, and goal clarity were each associated with the composite of workplace well-being at both Time 1 and Time 2. In addition, mindfulness—which predicted misalignment only at Time 2—also predicted Time 2 workplace well-being. See Tables 16 and 17 for details. Notably, in the Time 1 analyses, the association of self-image goals to workplace well-being became weaker when controlling for publication self-concordance: $r = -.11$, $p = .072$. In addition, when controlling for self-concordance at Time 2, the associations of ASCI and self-image goals to workplace well-being did not hold ($r = -.12$, $p = .202$ and $r = -.11$, $p = .215$ respectively), but all other

associations remained essentially the same. There was no clear evidence, however, for the direct association of perceived publication social value to workplace well-being at either time point.

Table 16

Correlations of Proposed Misalignment Antecedents to Workplace Well-Being (Study 5, Time 1)

Variables	1	2	3	4	5	6
1. Workplace well-being	-					
2. ASCI	-.25***	-				
3. Grad self-image goals	-.20**	.40***	-			
4. Publication social value	-.10	.14*	.26***	-		
5. Goal conflict	-.41***	.13*	.11†	.13*	-	
6. Goal clarity	.48***	-.20**	-.26***	-.05	-.22***	-

Note. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

Table 17

Correlations of Proposed Misalignment Antecedents to Workplace Well-Being (Study 5, Time 2)

Variables	1	2	3	4	5	6	7
1. Workplace well-being	-						
2. ASCI (Time 1)	-.25**	-					
3. Grad self-image goals	-.29**	.49***	-				
4. Publication social value	-.05	.14	.32***	-			
5. Goal conflict	-.38***	.19*	.20*	.08	-		
6. Goal clarity	.55***	-.22*	-.23**	-.07	-.20*	-	
7. Mindfulness (Time 1)	.40***	-.23*	-.14	-.05	-.18*	.21*	-

Note. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Next, and most importantly for the full models, I tested the indirect paths from these proposed antecedents to workplace well-being through misalignment. I first examined these models in the Time 1 data. Using the bootstrapping method with 10,000 samples (Hayes, 2013), there was only mixed evidence for an indirect path from ASCI to Time 1 workplace well-being through misalignment, 95% CI [-0.067, 0.004], as well as from graduate self-image goals to well-being through misalignment, 95% CI [-0.067, 0.004]. Next, I found an indirect path from publication social value to workplace well-being through misalignment, 95% CI [-0.076, -0.002]; although this was weaker when including publication self-concordance as a covariate, 95% CI [-0.046, 0.004]. There was only mixed evidence when testing these models with goal conflict, 95% CI [-0.038, 0.001], and goal clarity, 95% CI [-0.001, 0.039].

I next tested the indirect paths from the proposed antecedents to workplace well-being through misalignment in the Time 2 data. Using the bootstrapping method with 10,000 samples (Hayes, 2013), I found an indirect path this time from all six proposed antecedents to workplace

well-being through misalignment: ASCI (Time 1), 95% CI [-0.1287, -0.0100]; graduate self-image goals, 95% CI [-0.1556, -0.0129]; publication social value, 95% CI [-0.1275, -0.0085]; goal conflict, 95% CI [-0.1013, -0.0111]; goal clarity, 95% CI [0.0065, 0.1026]; and mindfulness (Time 1), 95% CI [0.0130, 0.1209]. Each of these indirect paths was weaker, though, when including publication self-concordance as a covariate: ASCI (Time 1), 95% CI [-0.0832, 0.0036]; graduate self-image goals, 95% CI [-0.1037, 0.0053]; publication social value, 95% CI [-0.0796, 0.0003]; goal conflict, 95% CI [-0.0646, 0.0019]; goal clarity, 95% CI [-0.0088, 0.0594]; and mindfulness (Time 1), 95% CI [0.0003, 0.0802]. Including performance orientation, on the other hand, affected only the models for ASCI and graduate self-image goals.

Longitudinal analyses on the full models. I next examined these direct and indirect associations across both time points. First, testing the direct associations, change in perceived publication social value was unrelated to change in workplace well-being, $B = 0.001$, $SE = 0.07$, 95% CI [-0.13, 0.13], $t(123) = 0.02$, $p = .983$, $ß = 0.001$; as was change in goal conflict, $B = -0.05$, $SE = 0.06$, 95% CI [-0.17, 0.07], $t(123) = -0.89$, $p = .375$, $ß = -0.07$; and need for cognition (Time 1), $B = -0.03$, $SE = 0.06$, 95% CI [-0.15, 0.08], $t(177) = -0.58$, $p = .561$, $ß = -0.03$. Increased goal clarity and mindfulness (Time 1 only), however, predicted increased workplace well-being: $B = 0.37$, $SE = 0.06$, 95% CI [0.25, 0.49], $t(123) = 6.12$, $p < .001$, $ß = 0.38$ and $B = 0.13$, $SE = 0.06$, 95% CI [0.02, 0.25], $t(123) = 2.35$, $p = .021$, $ß = 0.14$ respectively. The relation of mindfulness (Time 1) to changes in workplace well-being was weaker when controlling for change in publication self-concordance, $B = 0.10$, $SE = 0.06$, 95% CI [-0.10, 0.21], $t(122) = -1.80$, $p = .074$, $ß = 0.10$; all relations held when controlling for performance orientation.

Lastly, I tested the indirect paths from each predictor (trait variables at Time 1 and state variables at Time 2 controlling for Time 1) to the change in workplace well-being through the

change in misalignment. Using the bootstrapping method with 10,000 samples (Hayes, 2013), I found indirect paths from all five predictors to reduced workplace well-being through increased misalignment: increased publication social value, 95% CI [-0.1337, -0.0038]; increased goal conflict, 95% CI [-0.1243, -0.0139]; reduced goal clarity, 95% CI [0.0088, 0.1157]; low mindfulness (Time 1), 95% CI [0.0140, 0.1168]; and high need for cognition (Time 1), 95% CI [-0.0893, -0.0084]. All indirect paths held when controlling for the change in publication self-concordance. All indirect paths also held when controlling for performance orientation, with the exception of need for cognition (Time 1), 95% [-0.0747, 0.0143].

Discussion

First, examining the descriptive statistics for misalignment and related variables was informative in itself. Graduate students reported that misalignment is an important issue, but on average, reported relatively low misalignment themselves. Interestingly, though, they perceived the norm to be much greater misaligned pursuit of publication, on average, as compared to themselves. Similarly, participants on average overestimated the number of publications others had, as compared to the actual average number of publications for participants in this sample, suggesting graduate students may have pluralistic ignorance about the number of publication graduate students have. One can imagine how these misperceptions could play into one's evaluative concerns and amplify misalignment. Indeed, this was also supported by the finding that perceiving a greater norm of misalignment was related to greater personal misalignment, though the evidence for that was mixed at Time 2.

Next, in examining the primary hypotheses for antecedents to misalignment, Study 5 replicated the finding that the perceived social value of the indicator—in this case, publication count—predicted misaligned pursuit of the indicator at both time points. This held using the new

operationalization of both perceived social value and misalignment in this study, as well as when controlling for publication self-concordance and performance orientation. As in previous studies as well, ASCI and to a lesser extent self-image goals also predicted misalignment, which was mediated at Time 1 through perceived publication social value. Though the direct effects were actually stronger at Time 2, particularly for self-image goals, the mediation pathways only had mixed evidence at Time 2, suggesting that there may have been other routes by which chronic evaluative concerns were related to misalignment that were not captured by the current measure of perceived indicator social value. Notably, all above findings also held when controlling for intentional indicator priority—consistent again with the hypothesis that evaluative concerns can lead to misalignment even from one's own valued goals.

Interestingly as well, the perceived instrumentality of publication count for employment was unrelated to misalignment at both time points—and similarly, job anxiety was unrelated to misalignment, even for those most interested in a research-focused academic career. As addressed further in the general discussion, this may suggest that misalignment is less motivated by practical, external ends than is often assumed. On the other hand, proposed unintentional routes—low goal clarity and high goal conflict—were found to be predictors of misalignment at both time points, which indeed held when controlling for intentional indicator priority, as well as when controlling for publication self-concordance and performance orientation at Time 2, though not at Time 1. As also addressed further in the general discussion, this may suggest an important role for self-reflection in the process of re-alignment.

Moreover, the longitudinal design permitted an examination of how the proposed trait antecedents and changes in the state-level antecedents predicted changes in misalignment from Time 1 to Time 2. Interestingly, chronic evaluative concerns did not emerge as predictors of the

change in misalignment. One possible explanation is that the effects of chronic evaluative concern on misalignment are already well-instilled for upper-year graduate students; however, more research is needed to address this question. Changes in perceived publication social value, on the other hand, did predict changes in misalignment—though the evidence for this relation was mixed when controlling for publication self-concordance. In addition, low goal clarity, high goal conflict, and mindfulness all emerged as significant predictors of the changes in misalignment, which all held controlling for both publication self-concordance and performance orientation—further supporting the idea that misalignment may emerge from a lack of recognition or personal clarity. Lastly, need for cognition was also a significant predictor of the changes in misalignment, though this effect did not hold when controlling for publication self-concordance.

In examining the hypotheses for consequences of misalignment, Study 5 replicated previous findings: Misalignment predicted reduced workplace well-being. In particular, misaligned pursuit of publication predicted lower work authenticity and lower meaning and engagement in one's work at both time points. Associations to well-being more broadly, however, did not emerge until Time 2. Specifically, misalignment at Time 2 predicted lower authenticity, lower meaning and engagement, lower overall satisfaction with graduate school, and lower life satisfaction. It is unclear why the associations to well-being were so much stronger at Time 2 vs. Time 1, but as the Time 1 survey took place right before winter break (vs. the middle of a term), one possibility may be that the upcoming break allowed students to take their minds off the stressors of graduate school. Notably, many of these associations had only mixed evidence supporting them when controlling for publication self-concordance. Importantly, however, longitudinal analyses revealed that even when controlling for changes in publication

self-concordance, changes in misalignment were still related to changes in authenticity, meaning, engagement, overall graduate school satisfaction, and overall life satisfaction.

Interestingly, in follow-up cross-lagged analyses for both the tests of proposed antecedents and consequences, there was very little evidence supporting either specific direction of causation. There are many possible reasons that these associations may not have clearly emerged over the time interval tested and it will require future research to clarify. In particular, although this longitudinal study is a step in the right direction, this underlines the need for future experimental research to directly test causation. Two relations did emerge, however: Time 1 misalignment predicted marginally increased symptoms of depression and anxiety over time and—in a reversal of the present model—Time 1 authenticity predicted reduced misalignment. These findings will need to be replicated but, if reliable, may have a number of possible explanations, as addressed further in the general discussion.

Lastly, Study 5 was also the first to permit a test of larger models, including both proposed antecedents and proposed consequences of misalignment. Consistent with the general proposed framework, the one path that consistently emerged was that higher publication social value predicted greater misalignment and, in turn, lower workplace well-being. Interestingly, though, there was no evidence that increased publication social value was directly associated with lower workplace well-being. This suggests that other factors may contribute to a positive association between publication social value and workplace well-being. One possibility, for example, could be that student motivation leads to greater sensitivity to the social value of publication and to higher workplace well-being—but that this positive association is balanced out by the negative association of perceived publication social value to well-being through misalignment. Notably as well, this indirect path was much weaker when controlling for

publication self-concordance. Importantly though, again, the longitudinal analyses revealed that even when controlling for changes in publication self-concordance, there was an indirect path from increased publication social value to increased misalignment and, in turn, to reduced workplace well-being.

The longitudinal analyses also revealed three additional indirect paths that held when controlling for changes in publication self-concordance, though with more exploratory antecedent variables: reduced goal conflict, increased goal clarity, and mindfulness. Each of these predicted reduced misalignment and, in turn, increased workplace well-being. These findings provide further support, as noted above, that self-awareness may be a central aspect of misalignment. This will require further investigation, but may provide a promising avenue for intervention.

General Discussion

In three studies examining the psychological antecedents to misalignment (Studies 1, 2, and 5), I found that the perceived social value of an indicator was related to misalignment: The more people felt an indicator was publicly valued and used to judge them, the more likely they were to pursue that indicator at the expense of a corresponding underlying goal. This pattern was consistent across all five indicators tested, including those explicitly accepted and used to measure organizational performance (e.g., publication count) but also those that are typically used more privately (e.g., number of pages read). Importantly, this pattern was also consistent regardless of one's intentions—i.e., the perceived social value of the indicator predicted veering off course even from an underlying goal that one personally endorses and intends to prioritize (Studies 2 and 5).

In addition, the perceived social value of an indicator was in most cases higher for individuals with chronically high evaluative concerns. Specifically, I found across a wide variety of indicators (the large majority of observations) that those chronically high in evaluative concerns—i.e., high in attention to social comparison information (ASCI) and self-image goals—were more likely to perceive indicators as socially valued and, in turn, to experience misalignment. Together these findings suggest that misalignment may be likely to emerge not only from situations where an indicator is truly valued, but also in situations where people are most concerned about fitting in or gaining approval—and thus exaggerate the true value of indicators.

Further, in three studies examining the psychological consequences of misalignment, I found that misalignment predicted reduced authenticity and well-being (Studies 3-5). Teachers who pursued a self-identified indicator (e.g., standardized tests) at the expense of their broad teaching goals felt less authentic at work and, in turn, experienced greater burnout. They were also less satisfied and committed to their current job, though not to education itself. Similarly, graduate students who pursued publication count at the expense of scientific contribution felt less authentic at work and felt their work was less meaningful and engaging. Though less consistently observed, misalignment was also related to broader well-being consequences for graduate students at Time 2, such as overall dissatisfaction with graduate school and life.

Lastly, Study 5 also provided initial longitudinal evidence that misalignment and proposed causally-related variables move in tandem. Specifically, I found that increases in the perceived social value of publication over a three-month period predicted increased misaligned pursuit of publication—and, in addition, that this increased misalignment predicted reductions in well-being: reduced authenticity, meaning, and engagement in work, as well as reduced overall

satisfaction with graduate school and life. In testing the full model from antecedents to consequences, there was also mediational evidence consistent with increased perceived social value of publication leading to increased misalignment and, in turn, to reduced well-being.

Implications for understanding why misalignment occurs

These findings are especially important in light of the way misalignment is typically characterized. Misalignment in organizations is frequently attributed to the rewards or sanctions associated with certain indicators (e.g., Johansson, 2015; Perrin, 1998; Schwartz, 2011; Solmon & Podgursky, 2000)—with the often explicit assumption that individuals are acting in a straightforward, self-interested way to obtain rewards or avoid sanctions. Even when less explicit, this assumption about people's underlying motives is often implied by language such as "creaming" or "gaming the system" (e.g., Fryer et al., 2009; Hamilton, Schwartz, Stecher, & Steele, 2013; Kelman & Friedman, 2009; Osterloh, 2010). And indeed, a narrow self-interested explanation is parsimonious: If the system rewards certain behavior, people perform that behavior in pursuit of the rewards. There is even evidence linking the use of indicator-based rewards to misalignment (Speklé & Verbeeten, 2014).

Critically, however, evidence linking rewards to misalignment is not necessarily evidence that the reward itself is motivating. Barsky (2008), for example, suggests that a key function of organizational rewards is to signal what is valued in a given work context, i.e., to define prescriptive norms. In real work contexts, it is often difficult to tease apart the inherent value and symbolic value of a reward. Publication, for example, is necessary to get a job and tenure, which are of course important motivators in themselves. A potentially deeper motivator, however, is often overlooked: that publication and tenure are what it means to be a good researcher. They are how, as a community, success has been defined. This suggests that even in contexts where the

indicator is rewarded, the path to misalignment can begin not just with a narrow intent to exploit the system but also—ironically—with a noble intent to excel by the standards defined by the community.

The current studies indeed support this latter explanation. As discussed above, the perceived social value of indicators consistently predicted misalignment even for those who intended to prioritize the underlying goal. In addition, a narrow self-interest model would likely not predict the consistent association observed between misalignment and reduced well-being. Yet perhaps more provocative is what I did not find. In particular, in examining the antecedents to organizational misalignment (Study 5), I hypothesized that personal consequences, e.g., future job attainment, would play an important role in graduate students' misalignment. In contrast to the perceived social value of publication within students' immediate community, however, the instrumentality of publication for employer evaluations was unrelated to misalignment at both time points. Similarly, there was only mixed evidence that students' anxiety about getting a job was related to misalignment at both time points, even specifically for students who were highly interested in a research-focused academic career.

In future work, it will be important to see if these findings replicate and to test the perceived instrumentality of publication for more immediate rewards, e.g., grant applications. These findings suggest, however, that the pressure to prioritize publication—and potentially other indicators as well—may not emerge as much from important practical consequences as often assumed. Indeed, this possibility is consistent with existing evidence that we tend to overestimate how much people care about extrinsic incentives like pay and job security (e.g., Heath, 1999) and underestimate how much people care about embarrassment and reputation in their immediate social circles (Sabini, Siepmann, & Stein, 2009; Van Boven, Loewenstein, &

Dunning, 2005). Even in a "publish or perish" world, misalignment may be driven less by the desire to save one's career per se and more by the desire to save face.

Misaligned and unaware. Interestingly, I found initial exploratory evidence that a lack of awareness or personal clarity may also contribute to misalignment (Study 5). In particular, lower mindfulness at Time 1 predicted increased misalignment over time. Similarly, low goal clarity and high goal conflict were related to misalignment at both time points, as well as to the change in misalignment over time. These findings also held even for those who intended to prioritize the underlying goal—suggesting that people may become narrowly focused on indicators without intending or even fully recognizing this pattern. Also consistent with this possibility, in the open-ended responses at the end of each study, participants often spontaneously commented that filling out the survey was revealing, provided important reflection, or cued them that more self-reflection was needed.

Misalignment could indeed go under the radar for many reasons. For one, with the exception of the most blatant misconduct, indicator performance may come genuinely to be seen as synonymous with the underlying goal—a process which is referred to as "commensuration" (Espeland & Sauder, 2007; Espeland & Stevens, 1998). From performance and experience with many dimensions, quantitative indicators draw our attention to specific information, which is simplified and decontextualized. This reductionism is not inherently a problem; in fact it is often the point, to summarize and convey a reality succinctly. However, when an indicator is regularly used, it means consistently seeing the world from this imperfect lens. Further, this limitation often goes unrecognized. Quantitative indicators, in particular, often appear more authoritative and are taken at face value (March & Simon, 1958). Anything the indicator does not capture, then, may lose visibility and come to feel less "real" (Espeland & Sauder, 2007). Activities that

do not clearly contribute to one's own publications, for example, may be seen less and less as real contributions to science.

In addition, as touched on briefly in the introduction, even a person who makes a very clear conceptual distinction between the indicator and the underlying goal may fail to realize when her actions prioritize one over the other (Barsky, 2008). Indeed, although indicators may often be imperfect, they typically gain popularity because they do capture the underlying goal to a large degree. As a researcher, for example, training a research assistant or analyzing data could just as well promote publication as it does science. Even when straying further and further from a pure focus on scientific contribution, it may be difficult to recognize one's misalignment without stepping back and taking a broad look at one's behavioral patterns. Moreover, if people are indeed averse to recognizing their misalignment and feel inauthentic as a result, they may engage in motivated reasoning and conclude that they are more aligned than they are (Kunda, 1990).

Limitations and directions for future research

The possibility that individuals can be unaware of their misalignment points to an interesting area for future research as well as the need for new methods in the investigation of misalignment—specifically moving beyond the use of abstract self-report measures. In one sense, using self-report should provide a conservative test of the current hypotheses, given that those high in ASCI and self-image goals have relatively high social desirability concerns and are likely the individuals most prone to underreporting misalignment. Nonetheless, this implies that misalignment may be underestimated in the present work—and especially so if people are not only intentionally concealing their misalignment but at times unaware of it. A central dynamic of misalignment may thus be overlooked in the present studies.

Multiple new approaches are possible to address this measurement limitation and build on the present research. For one, I have begun to develop assessments of the concrete activities that misalignment entails in different domains, i.e., identifying specific activities that are perceived as highly instrumental for the indicator but not for the underlying goal and vice versa. For example, getting answers on assignments and cramming for tests are generally perceived as helpful for grades but less so for learning; whereas doing readings that are suggested but non-mandatory are perceived as helpful for learning but less so for grades. Assessing concrete activities like these using a daily sampling technique could help remove some of the ambiguity and room for bias in the current measure. Another promising direction, to work around self-report issues altogether, could be to have close others report on participants' misalignment. In addition, whether people downplay their misalignment could be tested more directly. It is well-established, for example, that self-affirmations such as reflecting on the importance of a deeply held personal value can reduce defensiveness (Sherman & Cohen, 2006; Steele, 1988). If my speculation is correct that individuals at times engage in motivated reasoning to avoid the discomfort of recognizing their misalignment, then self-affirmation could lead to greater awareness of and willingness to report misalignment.

It will be important in future work to establish causation for the associations observed between what I have called here antecedents, alignment, and consequences. Although the present research clearly demonstrates that misalignment is reliably correlated to the proposed antecedents and consequences across a variety of samples and target indicators, it is yet to be determined whether these variables are causally related in the proposed directions. For the association of misalignment to proposed well-being outcomes, in particular, there were signs that negative well-being may be related to misalignment in other ways than as an outcome. For one,

while the association of teachers' misalignment to burnout was robust, the association of misalignment to authenticity became negligible when controlling for organizational rigidity (Study 4). In addition, while graduate students' misalignment at Time 1 predicted marginally increased symptoms of depression and anxiety from Time 1 to Time 2, it was the reverse for authenticity: Time 1 inauthenticity predicted increased misalignment from Time 1 to Time 2 (Study 5).

These patterns will need to be replicated, but if reliable, the causal relations of these variables will need to be explored. It could be, for example, that there is a cyclical pattern between misalignment and negative well-being. Negative self-awareness, e.g., following failure or social exclusion, has been shown to lead to a "deconstructed" state or narrow focus on the present and concrete—as meaningful thought, emotion, and self-awareness in these situations can be aversive (Baumeister, 1990; Twenge, Catanese, & Baumeister, 2003). One possibility, then, is that the aversive state of feeling inauthentic leads to a narrower focus on indicators and, in turn, reinforces negative well-being. Another possibility, as discussed in Study 4, is that organizational rigidity—or a lack of participation and involvement in the decisions that affect one's work—fosters both inauthenticity and misalignment but that it takes longer to become aware of one's misalignment as compared to inauthenticity. This could also explain why inauthenticity was a precursor to increased misalignment in Study 5—a figurative canary in the coal mine. These are only a few possible causal narratives, however, which will need to be examined in future work, ideally experimental. Given that the perceived social value of an indicator lends itself well to being manipulated, this could be one fruitful place to start: directly testing its effects on misalignment and well-being.

Misalignment in relation to indicator self-concordance. Notably, certain findings were weaker when controlling for indicator self-concordance. In particular, when controlling for publication self-concordance in Study 5, the associations of graduate students' misalignment to authenticity and meaning became weaker—and the evidence for the associations to several additional well-being measures observed at Time 2 became negligible: specifically, work engagement and both graduate school and life satisfaction. In addition, the evidence for the associations of ASCI and self-image goals to misalignment at Time 2 was less than compelling when controlling publication self-concordance. Consistent with these findings, misalignment and publication self-concordance, themselves, were correlated at both time points. Taken together, this suggests a close conceptual overlap between these variables. Indeed, it is possible that measuring self-concordance in the pursuit of an indicator is actually one route to assessing the degree to which that indicator is aligned or "fused" with the underlying goal (Kruglanski et al., 2018). Again, future work will be needed to clarify these relations. Critically, however, while certain associations were not fully independent of self-concordance, misalignment did have clear independent associations in most cases—especially in the longitudinal analyses.

Practical implications

When considered as a whole, the findings in this dissertation may help build on the existing recommendations for addressing misalignment and promoting re-alignment. Notably, many of the recommendations in previous research have received mixed support. For example, relying less on performance indicators and indicator-based goals may be useful but only if an effective alternative is available (e.g., Johansson, 2015; Ordóñez et al., 2009). Similarly, the efficacy of developing more valid measurement systems—e.g., using multiple indicators, qualitative indicators, or regularly revising indicators—is contested and appears not to provide a

complete solution (e.g., Bohte & Meier, 2000; Gilliland & Landis, 1992; Gioia & Corley, 2002; Kelman & Friedman, 2009; Mannion & Braithwaite, 2012; Perrin, 1998; Ridgway, 1956). Two more consistently-endorsed recommendations have emerged, however, which the present findings support and could help develop further: 1) involving stakeholders in the identification of indicators and 2) shifting to a greater emphasis on socialization and values. I will address each in turn.

One consistent recommendation for intervening in organizational misalignment, as noted briefly in Study 4, is to involve stakeholders in the identification of indicators and indicator-based goals (e.g., Barsky, 2008; Fryer et al., 2009; Mannion & Braithwaite, 2012; Perrin, 1998). Participating in this process allows people to think more broadly about what their underlying goal truly is and about the nature of the indicator as exactly that: only one measure of the underlying goal. As noted above, this step of awareness and recognition may be central to preventing misalignment. Consistent with this idea, Barsky (2008) argues that participation in goal-setting makes individuals more likely to recognize ethical issues and take personal responsibility. In one study, for example, pizza delivery drivers who participated in setting safety goals for target behaviors like seatbelt use also improved in safety behaviors that went beyond those directly targeted by the intervention, e.g., intersection stopping. This was not the case, on the other hand, for drivers who were merely assigned goals (Ludwig & Geller, 1997). In other words, participating in goal-setting decreased the likelihood of passive misalignment, i.e., focusing only on those safety behaviors which were known to be measured.

Building on this logic and the Study 5 findings supporting the role of awareness in misalignment, a potentially powerful individual-level intervention could be to directly address individuals' lack of awareness or clarity. Indeed, the fact that people often spontaneously

reported that the surveys were revealing suggests that, in certain cases, greater self-insight about misalignment can come from as little as answering a few survey questions about one's underlying goals and the indicators used to assess them. It would be interesting, then, to test whether a structured abstraction exercise, guiding participants through the pitfalls of misalignment—e.g., reflecting on differences between the indicator and underlying goal and on patterns of one's own behavior—could potentially be a powerful method of increasing recognition and promoting re-alignment. Certainly, some individuals may already be aware of their misalignment, or, given greater awareness could still explicitly choose a misaligned route. Nonetheless, the potential well-intending routes to misalignment suggest that this could be a promising avenue of intervention to explore for many individuals.

A second widely-supported recommendation to address organizational-level misalignment—though often described using different terms—is to shift to a greater emphasis on socialization and values (e.g., Kelman & Friedman, 2009; Osterloh, 2010; Schwartz, 2011). In academia, for example, Osterloh (2010) recommends shifting from "output control," i.e., assessing and attaching consequences to indicators like publication count and h-index, to greater emphasis on "input control," i.e., careful selection and socialization. How specifically to implement these socialization approaches, however, is a delicate issue. At first glance, given the role of evaluative concerns in misalignment (Studies 1, 2, and 5), it may seem advantageous to foster a culture which minimizes evaluative concerns in general. It is important to recall, however, that even when some degree of misalignment occurs, focusing on an indicator is not necessarily a net loss for the underlying goal; and particularly when intrinsic motivation does wane, evaluative concern may have some benefit.

Similarly, it may seem helpful to foster an organizational culture that emphasizes the importance and shared commitment to the underlying goal itself. The present findings, however, give pause to this approach as well. In particular, even when controlling for the social value of grades, the social value of learning was not related to greater alignment and, similarly, when controlling for the social value of weight, the social value of health was not related to greater alignment (Study 2). In addition, the perceived social value of these underlying goals and corresponding indicators were closely related—consistent with the possibility that, as the stakes for appearing successful with the underlying goal are increased, the risk of unintentionally enhancing the perceived social value of indicators may increase as well.

What might be more effective, however, is not discounting evaluation or indicators altogether, but creating a culture that does acknowledge and take very seriously their limitations (e.g., Perrin, 1998). The truth is that good performance can and often does go unrecognized (see Kruger & Dunning, 1999; Dunning, 2011; Dunning, 2015)—and we ought to reinforce and validate a shared belief in these evaluative limitations rather than sweep them under the rug. As a concrete example, drawing on the idea that narratives can stimulate ethical reflection (Williams, 1998), one idea could be test whether reading narratives on the theme of unrecognized good could help individuals self-validate when appropriate and buffer against misalignment. One very common narrative that fits this theme, for example, is that of the unsung hero. This speculation goes well beyond the present findings, but would be interesting to test in future work. Indeed, perhaps one reason the idea of unsung heroes is so enduring, particularly in moral and spiritual writing, from the Tao Te Ching to Kierkegaard, is its power to help people maintain a path of integrity or alignment even when the value of one's efforts are not immediately reflected.

Conclusion

The model and findings presented in this dissertation answer a growing call for research to understand the mechanisms and implications of misalignment (e.g., Barsky, 2008; Campbell, 1976; Espeland & Sauder, 2007; Fryer, Antony, & Ogden, 2009; Ordóñez, Schweitzer, Galinsky, & Bazerman, 2009; Schwartz, 2011; Van Thiel & Leeuw, 2002). The model draws insight in particular from the long history of management science on the unintended consequences of indicator use—revealing an important but unrecognized point in psychology that misalignment occurs even without intentional goal-setting. In turn, drawing on classic social psychological concepts, such as the power of social influence and the often surprising banality of unethical behavior (e.g., Baumeister & Leary, 1995; Milgram, 1963; Haney, Banks, & Zimbardo, 1973), the present theory and findings help refine our understanding of misalignment. They suggest new insights into when and why misalignment occurs—even against our best intentions—as well as how this experience of straying from underlying goals relates to individual well-being. As our reliance on quantitative indicators rises, it is indeed increasingly important to gain a deeper understanding of misalignment, an aim which may be possible through further integrating psychology and management science.

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Appendix A

Additional Measures Administered in Study 1

The following measures were adapted to each of the four indicator blocks. All measures used a six-point scale from 1(*strongly disagree*) to 6(*strongly agree*) and were self-generated unless otherwise noted.

Indicator personal value. Indicator personal value was assessed using four items: "I think a lot about my [indicator]"; "I regularly check or consider my [indicator]"; "I often use [indicator] to evaluate how I'm doing"; and "My [indicator] typically makes a big difference in how I feel about myself;" (αs = .86 - .92). One item hung together poorly across all domains and was thus excluded: "I identify as someone who should excel with [indicator]."

Indicator validity. The measure of perceived indicator validity began with the introduction, "Imagine someone is focused on maximizing [indicator]," followed by two items, which were reverse-coded: "There's a lot they could do to [increase indicator] that wouldn't actually help much with [broader goal]"; and "If they focused too much on [indicator], important aspects of health and fitness could be neglected" (*r*s = .49 - .71). A third item hung together poorly across all domains and was thus excluded: "It's almost always the case that the [greater the indicator], the more true one is to [broader goal]."

Indicator utility. Three items assessed indicator utility: "[Indicator] is easy to quantify or measure"; "[Indicator] can provide helpful feedback"; and "Keeping track of [indicator] is helpful for [broader goal] overall" (αs = .75 - .78).

Indicator performance. Current indicator performance was assessed using the single item, "I am currently doing well with [indicator]."

Indicator-value connection. The measure of indicator-value connection began with the introduction, "Think about the value or broader purpose of [underlying goal]," followed by three items: "When I'm [pursuing the indicator], I feel connected to this broader purpose"; "When I choose to [pursue the indicator], I'm driven by this broader purpose"; and "Whenever I think about [the indicator], I automatically think about this broader purpose" (αs = .91 - .94).

Indicator self-concordance. To assess self-concordance of each indicator pursuit, I used an established scale (Sheldon, 1999), which I adapted to each block using the introduction, "Why do you typically [pursue indicator] when you do?" Participants responded to four items which were designed to assess motivations on the spectrum from intrinsic to fully extrinsic: "[Pursuing indicator] brings me fun and enjoyment"; "I genuinely believe [pursuing indicator] is an important goal to have"; "I would feel guilty for not [pursuing indicator]"; "Someone else wants me to [pursue indicator] or the situation demands it." Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*). Self-concordance scores were then calculated as the sum of the first two items minus the sum of the second two items (e.g., Judge, Erez, Bono, & Locke, 2005; Sheldon & Elliot, 1991).

Automatic indicator pursuit. Automatic indicator pursuit was assessed using three items: "There are times I [pursue indicator] without really considering why"; "I [pursue indicator] regularly enough that I do it without thinking"; and "[Pursuing indicator] has become a habit for me" (αs = .72 - .91).

Individual Difference Measures

Three individual differences were assessed, as well as an exploratory measure of cognitive deconstruction.

Self-control standards. The measure of self-control standards began with the question, "How high of a standard do you typically uphold in the following self-control domains?"

Participants responded on scales from 1(*very low*) to 6(*very high*) for six domains: eating well, exercising, cleaning, studying, saving money, overall ($\alpha = .76$).

Self-control rigidity. The measure of self-control rigidity began with the question, "To what extent are you typically rigid versus flexible in your personal self-control?" A rigid approach was defined as one that "uses explicit personal rules that apply across contexts" and a flexible approach was defined as one that "uses more intuitive guidelines, i.e., deciding how to act on a relatively case-by-case basis." Participants responded on scales from 1(*very flexible*) to 6(*very rigid*) for six domains: eating well, exercising, cleaning, studying, saving money, overall ($\alpha = .71$).

Numeracy. Numeracy was assessed using an established measure (Lipkus, Samsa, & Rimer, 2001), including five items, e.g., "Imagine we roll a fair, six-sided die 1000 times. Out of 1000 rolls, how many times do you think the die would come up even?" Participants responded using open-ended text boxes.

Cognitive deconstruction. Five items were designed to assess cognitive deconstruction (see Twenge, Catanese, & Baumeister, 2003): "I find it difficult to think about the future"; "I can only think about the present"; "I am most concerned about how I feel in the present"; "I often feel lethargic"; and "I often feel anxious and stressed out" ($\alpha = .77$). Participants responded using 6-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Appendix B

Additional Measures Administered in Study 2

The following measures were adapted to both indicator blocks. Indicator validity was assessed (as in Study 1), as well as the four measures detailed below. All measures used a six-point scale from 1(*strongly disagree*) to 6(*strongly agree*).

Indicator personal value (adjusted). The measure of indicator personal value was shortened to three items: "I think a lot about [indicator]"; "I regularly check or consider my [indicator]"; and "I care a lot about [indicator]" (α = .84 for grades α = .91 for weight).

Underlying goal personal value. The personal value of the underlying goal was assessed using the same three items as for indicator personal value above—only substituting in the name of the underlying goal instead of the indicator, e.g., "I think a lot about [underlying goal]" (α = .87 for learning and α = .92 for health and fitness).

Automatic indicator pursuit (adjusted). The automaticity measure was changed to use the existing self-reported behavioral automaticity index (SRBAI; Gardner, Abraham, Lally, & de Bruijn, 2012)—adapted to indicator pursuit. The introductory stem was "Pursuing [indicator] is something…" followed by four items, e.g., "I do without thinking" and "I do before I realize I'm doing it" (α = .91 for grades α = .93 for weight).

Performance (adjusted). In this study, both indicator and underlying goal performance were assessed. Participants responded to two items: "I usually [do well with the indicator]" and "I usually [do well with the underlying goal]." At the end, participants also reported their approximate grade point average; and height and weight (to calculate body mass index).

Individual Difference Measure

Trait self-control. Trait self-control was assessed using an established scale (α = .81; Tangney et al., 2004).

Appendix C

Additional Measures Administered in Study 3

The following self-generated measures were included.

Indicator pressure. Indicator pressure was assessed using three items: "I feel pressured to focus on [indicator]," "My personal career advancement depends on [indicator]," and "In my own self-evaluations, I put a lot of weight on [indicator]," (α = .59). This measure was improved for use in Study 4. In addition, one exploratory item related to pressure was assessed as a possible moderator, "Pressure or not – it's my choice how much to focus on [indicator]," but was removed in Study 4. Participants responded to all items using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Indicator orientation. Two single-item measures assessed individuals' orientation toward indicators as measures of teaching success. First, I defined for participants two different ways they might approach teaching, whether more focused on indicators (labeled "outcome focus") or less focused on indicators (labeled "broad focus"). I defined outcome focus as "working to help students improve on measures like [indicator] and sticking closely to the objectives that can be and are regularly assessed" and broad focus as "giving less priority to measures like [indicator] and being open to activities where the progress students make is less clear-cut or tangible." The items then assessed the extent to which participants prescriptively and descriptively endorsed an outcome (indicator) versus broad focus. I assessed prescriptive indicator focus using the item, "Ideally to what extent do you believe teachers should prioritize one over the other?"; and descriptive indicator focus using the item, "In practice, to what extent do you believe you typically *do* prioritize one over the other (either by choice or because of

situational pressures)?" Both used a six-point scales from 1(*100% outcome; 0% broad focus)* to 6(*100% broad; 0% outcome focus*).

Indicator invalidity. I assessed perceptions of indicator invalidity using two items I created: "There are things teachers can do to improve [indicator] that don't actually help much in terms of the broad goals of teaching" and "There are important things that would be neglected if a teacher got too focused on [indicator]" (r = .48). Participants responded using six-point scales from 1(*strongly disagree*) to 6(*strongly agree*).

Performance. Performance was assessed using three items, with the introduction, "How would you characterize your own recent teaching efficacy (or performance) relative to other teachers?" Participants were then prompted with the items: "how I appear according to [indicator]," "how I appear overall to my administration," and "how I would evaluate myself," which they rated on 10-point scales from 1(*0-9th percentile)* to 10(*90-99th percentile)*. These items were of interest individually, as well as the composite (Study 3 α = .77; Study 4 α = .86).

Cognitive deconstruction. As in Study 1, five items were intended to assess cognitive deconstruction (see Twenge, Catanese, & Baumeister, 2003): "I find it difficult to think about the future"; "I can only think about the present"; "I am most concerned about how I feel in the present"; "I often feel lethargic"; and "I often feel anxious and stressed out" (α = .85). Participants responded using 6-point scales from 1(*strongly disagree*) to 6(*strongly agree*). However, as cognitive deconstruction has not been directly assessed prior to this work—and several items demonstrated poor discriminant validity from burnout—analyses using this measure were interpreted with caution.

Appendix D

Additional Measures Administered in Study 4

Two additional measures were included.

Cognitive deconstruction (adjusted). Three items assessed cognitive deconstruction: "I find it difficult to think about the future"; "I can only think about the present"; and "I am most concerned about how I feel in the present" (α = .77). Participants responded using 6-point scales from 1(*strongly disagree*) to 6(*strongly agree*). Notably, two items from the previous measure (related to lethargy and anxiety; see appendix C) were closely related to burnout in Study 3 and were deemed less essential to the concept of cognitive deconstruction (see Twenge, Catanese, & Baumeister, 2003). They were thus removed in the present version.

Intrinsic vs. extrinsic work orientation. An established scale was included to assess intrinsic work orientation and extrinsic work orientation (Malka & Chatman, 2003; α = .81 and r = .55 respectively). This measure was included as a potential moderator of the association between misalignment and well-being, but was beyond the scope of this dissertation.

Appendix E

Additional Measures Administered in Study 5

The following one-item measures were included for exploratory purposes.

Burnout. Participants rated the single item, "I feel burned out from being in graduate school," using a six-point scale from 1(*strongly disagree*) to 6(*strongly agree*). This was adapted from the single face-valid item in Study 4, "I feel burned out from my work" (Maslach & Jackson, 1981), as it had a very high internal consistency with the full burnout scale (corrected item-total correlation of .84).

Publication salience. Participants responded to the single item, "I think a lot about my publication count," using a six-point scale from 1(*strongly disagree*) to 6(*strongly agree*).

Personal value of various goals. Participants rated the importance of "contributing to science," "addressing specific applied issues," "developing your research skills and expertise," and "building a strong CV" on a 5-point scales from 1(*not at all important*) to 5(*extremely important*).

Satisfaction with various aspects of graduate school. Participants evaluated their satisfaction with three aspects of graduate school using a six-point scale from 1(*very dissatisfied*) to 6(*very satisfied*): "mentorship," "work-life balance," and "accomplishments thus far in graduate school."

Appendix F

Study 5 Pilot and Full Misalignment Scale

Study 5 Pilot: Methods

A pilot study (n = 98) was run to pre-test a new measure of misalignment. Graduate student participants identified the most salient indicators used to assess them, responded to two versions of the misalignment scale, and responded to measures of proposed correlates to misalignment, e.g.: the average frequency of "pro-science" behaviors," the average frequency of "anti-science" behaviors, and the importance of the identified indicators for department evaluations.

Misalignment. Participants were randomly assigned to a condition of receiving a lengthier introduction to the scale (vs. not):

> "There are many ways to target performance measures—some that are perfectly consistent with the broader values of the scientific endeavor, like thoughtfully preparing a lecture or writing a paper; and some that are less consistent, like grading easily to get better student evaluations or not being as transparent as you could be in your research. Similarly, some pursuits are likely to be more consistent with your personal values than others. Thinking of this, how would you characterize your own recent reality (whether by choice or situational pressures)?"

All participants then responded to the following six items in random order, using a scale from 1(*strongly disagree*) to 6(*strongly agree*):

- I do some things in pursuit of performance measures (e.g., awards, publications) that don't help much for science.
- My efforts to improve on performance measures and advance my career are inconsistent at times with purely scientific values.

- In graduate school, I work purely toward the goal of making the best scientific contribution I can. (reverse-coded)
- Sometimes I get narrowly focused on performance measures and, thus, neglect other things that would ultimately make me a better researcher.
- My pursuit of performance measures often takes priority—leaving me with little time for other activities that would ultimately make me a better researcher.
- I do a balance of valuable scientific activities, with very little bias towards things that boost my performance measures (reverse-coded)

After completing this scale, participants rated their difficulty in responding to the items on a four-point scale from *1*(no difficulty) to *4*(much difficulty).

Pro-science and anti-science behaviors. Participants rated ten "pro-science" activities that were likely candidates for those seen as instrumental to science but less instrumental for performance indicators, such as: "reading beyond what's required, e.g., work-related books, articles"; "proactively engaging in scholarly discourse, e.g., non-required talks, discussions"; and "developing technical skills beyond what's required, e.g., statistics, programming." In addition, participants rated ten "anti-science" activities that were likely candidates for those seen as instrumental to performance indicators but less instrumental for science, such as: "in a presentation or paper, overstating how expected a finding was"; "in a presentation or paper, omitting data that is closely related but messier"; and "citing a paper without reading it thoroughly (or at all)." Participants were randomly assigned to a condition of rating their own average frequency of engaging in these behaviors on a nine-point scale from *1*(none or almost none) to *9*(four hours per day or more); or to rating their perceptions of the perceived

instrumentality of these behaviors for both science and improving one's performance indicators on five point scales from *1*(very harmful) to *5*(very helpful).

Indicator importance. Participants first identified the top four indicators "that matter most in evaluating your performance." They then rated how important each identified indicator was for "your evaluation in your department." As they had already identified these as having some degree of importance, they used a four point scale from *1*(slightly important) to *4*(extremely important).

Study 5 Pilot: Results

Participants rated both versions of the misalignment scales as relatively easy to complete (M = 1.62, SD = 0.66), i.e., on average, descriptively between "no difficulty" and "slight difficulty." Based on open-ended reports, however, an introduction was deemed helpful (as seen in the version implemented in Study 5). Also, based the on open-ended reports and greater difficulty of first-year students, it was decided to include only upper-year students in the full study.

The misalignment scale exhibited acceptable reliability (α = .80) and all individual items exhibited item-total correlations above .50, with the exception of reverse-coded items—which were expected to be lower due to method variance. Next, I examined the associations of the misalignment scale to theoretically related variables: anti-science behavior, pro-science behaviors, and the perceived importance of indicators within the department.[18] Misalignment was related to students' self-reported frequency of anti-science behaviors (r = .48, p = .003); as well as to perceived indicator importance (r = .22, p = .003). Misalignment was not related to

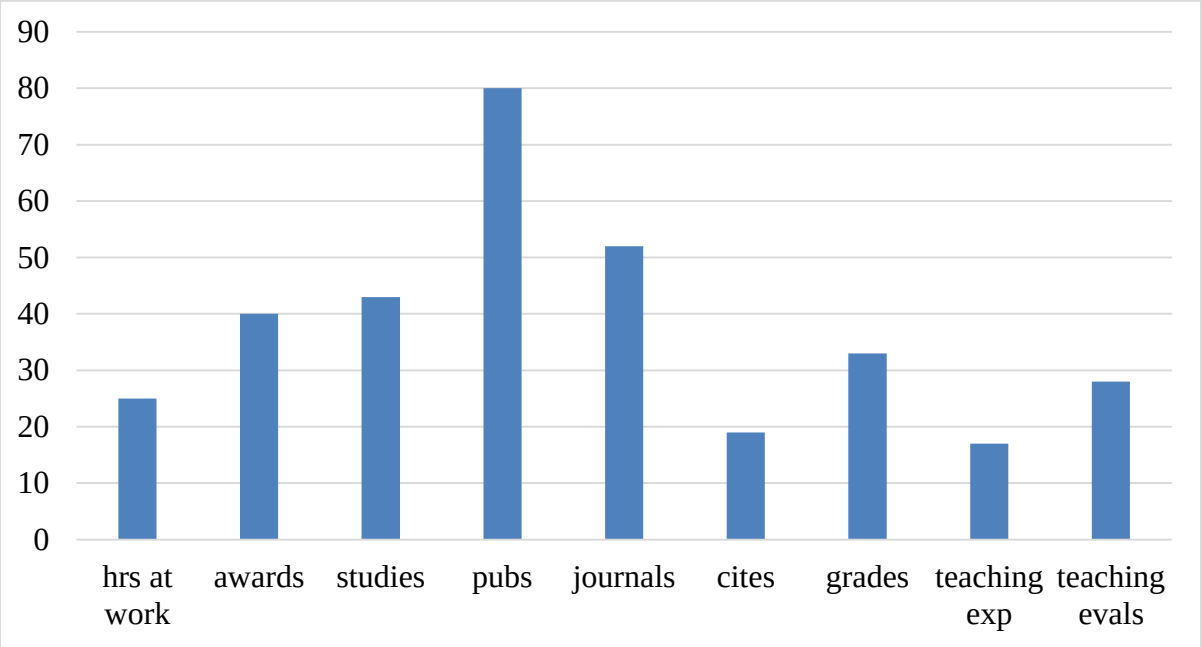
[18] It was confirmed that anti-science behaviors were perceived as, on average, harmful for science (M = 2.05, SD = 0.54), which was below the neutral midpoint, $t(47) = -12.12$, $p < .001$; and pro-science behaviors were perceived as helpful for science (M = 4.42, SD = 0.43), which was above the neutral midpoint, $t(47) = 22.46$, $p < .001$.

participants' pro-science behaviors ($r < .01$, $p = .981$). Looking at individual misalignment items, it was only the two reverse-coded items that showed a clearer negative relationship to pro-science behavior as expected, e.g., "I do a balance of valuable scientific activities with very little bias towards the things that boost my performance measures" was related to pro-science behavior ($r = .30$, $p = .043$). It was deemed that the reverse-coded items improved the overall validity; and, taken together, the scale had adequate reliability and predictive validity.

Lastly, I examined which specific performance indicators students perceived as most relevant to their evaluations (see Figure 13). Consistent with expectations, number of publications ("pubs") was the indicator most frequently identified as a top performance indicator used to evaluate graduate students. The next closest was related to publishing as well: the quality of journals published in ("journals").

Figure 13

Performance Indicators Relevant to Graduate Students: Frequency of Identification (n=98)



Due to the clear relevance of publication count over other performance indicators and the existing literature related to focusing on publication at the cost of scientific integrity (e.g., Janke et al., 2018; John et al., 2012), it was decided to focus on this indicator alone. Thus, the wording of the scale was changed from the more ambiguous "performance measures" or cumbersome "performance measures (e.g., awards, publications)," to simply referring to "publication." Based on open-ended responses, minor edits were also made for clarification—but otherwise the scale was retained as before.

Final Misalignment Scale (as Administered in Study 5)

After the introduction noted in the Study 5 text, participants responded to the following six items in random order, using a scale from 1(*strongly disagree*) to 6(*strongly agree*):

- I do some things primarily in pursuit of publication that don't help much for the good of science.
- My efforts to boost publications and advance my career are inconsistent at times with purely scientific values.
- I work uniquely toward making the best scientific contribution I can—rarely if ever doing anything just for the sake of publishing itself. (reverse-coded)
- Sometimes I get narrowly focused on performance measures—thus neglecting activities with less immediate or visible impact.
- Pursuing publication often takes priority—leaving me with little time for other things that would ultimately make me a better scholar.
- I do a balance of work activities, including things that are not very directly helpful for publishing. (reverse-coded)