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Regular Article

Exploring the measurement of political trust A multilevel observational analysis of six Swedish public agencies

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ABSTRACT

Political trust is a well-used construct and serves both as an explanation and an outcome in the social sciences. Considering the importance of the construct, relatively little attention has been allocated to its measurement. While the exist-ing literature on the measurement of political trust focuses on either developing and validating new scales, or scaling and equivalence assessment of the more gen-eral measures, this article contributes by analysing the contents of the widely used survey items of political trust. Put differently, what is in a typical political trust measure? The analysis uses relevant observational data from Sweden (n = 1760) with repeated questions over six public agencies, where the typically used trust measurement is regressed on theoretically motivated psychological antecedents of trust using a hierarchical heteroskedastic ordered probit model. Results imply that the typical trust measurement contains traces of perceived competence and less so perceived motivation. The results also suggest that political actors do carry meaning beyond the trust construct, influencing both the location and scale of the response distribution.

1. Introduction

Trust is one of the most debated concepts within the social sciences and is widely regarded as a core "building stone in social science theory" (Bauer & Freitag, 2017, p. 15). Both reliance/confidence in institutions (from now on political trust) and trust in other people (social trust) are closely linked to a variety of normatively highly valued outcomes such as health and well-being (Mohseni & Lindstrom, 2007), and is also regarded important for democratic governance more in general (Mishler & Rose, 1997, p. 419). Not the least, political trust has been linked to acceptance of and compliance with governmental policies, low corruption, a well-working democracy and countries' environmental performance (Hetherington, 1998; Jagers et al., 2019; Scholz & Lubell, 1998; Warren, 2017).

Despite its important role in social science theory and the great societal value, survey research focusing on political trust typically applies rather unsophisticated measures. While there is a theoretical agreement in the literature that political trust is a multidi-mensional construct (van der Meer & Hakhverdian, 2017), most of the prior empirical literature addresses political trust through a single survey item. For example, the American National Election Studies asks "[h]ow often can you trust the federal government in Washington to do what is right?" Summarizing the literature, Schneider concludes that "[…] political trust is considered an important object of study, [but] it currently rests on a weak theoretical and empirical foundation (2017, 976). In some recent publications, the standard unidimensional way of measuring polit-ical trust has been challenged through research by Kitt et al. (2021), Hamm et al. (2019), and Grimmelikhuijsen and Knies (2017). Individually, they challenge the unidimensional way of measuring trust by theorizing and empirically assessing several different dimensions of the trust concept. Yet, while we applaud all attempts to refine survey research on trust, we suggest that the literature can be furthered. Some of these previous attempts, we argue, capture close correlates of political trust, rather than core components of the concept. Another problem is that the prior

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literature disregard the role of opportunity as one core component of "three-placed" political trust. The "three-placed" perspective of trust, which is explained in more detail below, understands "political trust" as a three place relation where an agent (A) trusts another agent (B) to perform an act or ensure a state (C).

Therefore, with the purpose of contributing to the refinement of indicators of politi-cal trust in survey research, the aim of this paper is to explore the dimensionality of trust in six different Swedish public authorities. We bridge the most recent theoretical work on the definition of political trust and the empirically oriented survey research on trust. Following de Fine Licht and Brülde (2021), we argue that the morally neutral core of political trust is a particular form of agential reliance, which rests upon three

Conditions: competence, motivation, and opportunity.[1] We then utilize novel survey indicators to study variation in the perceived competence, motivation, and opportunity of six different public authorities, using unique survey data from the Swedish Citizens Panel (n = 1760; collected in 2020/21, December–January). Lastly, we investigate the extent to which each of these theoretically derived trust components can account for variation in the standard, single-item measure of trust in authorities. The main empirical analysis shows that people tend to differentiate between the three different trust conditions when they evaluate public authorities. We also find that perceptions about an agency's competence are more strongly aligned with the standard political trust item than perceptions about a public agency's motivation or opportunity to carry out its work.

The rest of the article is structured in the following way. First, we briefly review the current research on definitions and measurements of trust and discuss recent conceptual work on reliance and trust. Based on that, we claim that political trust should consists of three distinct dimensions: competence, motivation, and opportunity. We then move on to the literature on survey methodology and the challenges of capturing people's trust perceptions and to what extent these dimensions can be captured in survey research. In the subsequent section, we account for the data being used and the methodological operations forming the base for our empirical investigations. This is followed by a result section, a discussion, and some concluding remarks.

2. Theorizing political trust

The literature on "political trust" is extensive, spanning various disciplines and research fields. For our point of departure, we have chosen the conceptual work of de Fine Licht and Brülde (2021) due to its innovative approach within analytical philosophy in defining "trust." Their definition stands out as it is grounded in a coherent and explicitly stated set of criteria for adequacy, providing a clear and structured understanding of the concept. This systematic underpinning, which sets it apart from other definitions that typically lack such comprehensive development, is developed through dialogue with a wide range of proposals (e.g., Baier, 1986; Hardin, 2002; Luhmann, 1979; Mayer et al., 1995; Uslaner, 2002). By integrating this perspective, we aim to explore the concept of political trust with greater depth, and in doing so, merge insights from analytical philosophy and political science.

de Fine Licht and Brülde (2021) conceive of "political trust" as foremost a three place relation where an agent A trusts another agent B to C – and suggests that its core content is that A judges B to make C, ceteris paribus, more probable (in many cases highly probable or even certain). Thus, A trusts B to C when A judges B to increase the probability for C. If we restrict ourselves to the most relevant cases, i.e., where B is an agent (individual or collective), A trusts B to C if A judge B to be competent, motivated, and has the opportunity to C. Accordingly, A trusts some individual or collective agent B to perform an act or ensure a state C, if A judge that.

1. B is able to do (achieve, ensure, etc.) C (the competence condition)
2. B is motivated to do (ensure, etc.) C (the motivation condition)
3. B has a reasonable opportunity to do (etc.) C (the opportunity condition)

Following de Fine Licht and Brülde (2021), we argue that the neutral core of "political trust" rests upon competence, motivation, and opportunity. Thus, each of these trust conditions must be considered if we want to adequately refine the measurement of trust in survey research on trust has room for improvement. One fundamental problem that should concern us all is the imbalance between the (higher) level of sophistication found in the conceptual sphere, and the (lower) level of sophistication on the methodological side when it comes to measurement (Schneider, 2017). For measurement, theory acts as a blueprint for relating what is epistemologically observable to what is not, and in which direction these relationships travel (Adcock & Collier, 2001; Borsboom, 2008). Needless to say, any imbalances between the two are not good.

There are a few recent studies that have targeted the shortcomings of the standard single item approach to directly measuring political trust. In relation to the existing literature, our contribution lies closest to those who aim to base trust scales in theoretically derived models and separate trust from its psychological antecedents. Interesting examples include Kitt et al. (2021), Hamm et al. (2019), and Grimmelikhuijsen and Knies (2017). The latter two are similar in the sense that they take the trustworthiness model defined by Mayer et al. (1995; Schoorman et al., 2007) as their point of departure. That model stipulated that trust builds on an actor's willingness to accept vulnerability towards another actor and this independently of the ability to also monitor that other actor (p. 712). The decision to trust is driven by perceptions of trustworthiness that is constituted by ability, benevolence, and integrity. Kitt et al. (2021) do not explicitly take this model as their point of departure, but hypothesize that competence, integrity, and value similarity drive trust. Even though these accounts certainly represent great improvements, compared with earlier attempts, there are at least two reasons for why we suggest the use of the definition provided by de Fine Licht and Brülde instead. First, neither the integrity condition, nor any of the value similarity condition, the benevolence condition and the vulnerability condition, can be said to hold under scrutiny (see de Fine Licht & Brülde, 2021; 2022). The reason for this is that these conditions may be empirically correlated with trust, but they are hardly part of the concept itself. Since it is important to distinguish empirical correlations from conceptual judgments when it comes to defining and measuring trust (such that we get validity in measurements), one should thus avoid using these conditions.

Second, all the four above-mentioned accounts lack an opportunity condition. It simply seems unreasonable to think that A trust B to C if A judge that B do not have any opportunity to C and thus the aforementioned accounts need to have an opportunity condition added (ibid.). However, even though we should not delve into the conceptual issues too deeply - that has already been done by de Fine Licht and Brülde (2021) - it is crucial to address and clarify "opportunity" within this framework, as its interpretation can be variable and complex, especially in the context of political trust.

"Opportunity," in our study, is conceptualized as the set of external conditions and circumstances that enable or restrict a political entity's actions. This encompasses not only institutional structures and sociopolitical dynamics but also the efficiency of bureaucratic processes, legislative effectiveness, and resource availability. These factors are key elements of the 'output' side of the political system, influencing a government's ability to implement policies effectively. It is distinguished from 'competence,' which relates to the internal capabilities of the

[1] There is also a moral dimension to trust, according to de Fine Licht and Brülde (2021: 1991–97). However, they also argue that this dimension probably is not what matters in e.g., political science which is why we have not measured it here.

entity, and 'motivation,' which pertains to the intentions and desires driving the entity's actions. The inclusion of 'opportunity,' with an emphasis on output factors, in our analytical model addresses the imbalance between conceptual sophistication and methodological precision in political trust research, previously highlighted by Schneider (2017).

To illustrate the importance of output factors in the opportunity condition, consider a newly elected government in a country with efficient administrative processes and a well-functioning legislative body. The 'opportunity' for this government to implement its policies is significantly enhanced by these output factors. The government's effectiveness is not only dependent on a robust legal system or transparent electoral processes (input factors) but also on how well it can navigate through bureaucratic channels and legislative procedures to actualize its policy objectives. Conversely, a government in a setting with a sluggish bureaucracy or a gridlocked legislature faces significant hindrances in policy implementation, regardless of its competence or motivation. This could lead to a different type of political trust from the public, as their expectations and perceptions of the government's capabilities to enact change are critically influenced by these operational factors.

Thus, for A to trust B to do C, according to the de Fine Licht and Brülde account, A does not only need to judge that B is motivated and capable of doing C, but also that B has the opportunity to do C. Now, before we move on, it's important to address a potential confusion that might arise here. According to Hardin (2002), this is where much confusion lies: the conflation of "trust" and "trustworthiness". To consider an agent trustworthy, we do not need the opportunity condition. An agent can be trustworthy even if they never have the opportunity to demonstrate it, to cite one example. However, for me to trust the government to implement a specific policy, I need to believe that it has the opportunity to do so. Otherwise, it seems illogical to trust the government in this specific regard. I could trust the government and thereby believe they will do everything they can to govern effectively, but I cannot trust them to implement specific policies if I know they will never be in the context needed to do so. So, the government can be perceived as trustworthy, and we can trust it to perform other functions, however, it seems strange to say that we can trust the government to do something it has no opportunity to do.

With all this being said, our and other empirical studies might show that the opportunity condition, even though relevant in principle they might not be so in practice. For instance, people might not always consider the 'opportunity' aspect when forming judgments of trust in political entities. This could be due to a general assumption that certain positions or roles inherently possess the necessary opportunities. For example, citizens may assume that a politician, by virtue of their office, has the requisite opportunity to influence policy or represent constituents, even without a detailed understanding of the political or institutional constraints they face. This assumption can lead to an overemphasis on competence and motivation in the public's perception of trustworthiness, potentially overlooking the critical role of opportunity.

Lastly, it is important to note that our initial conceptual framework, based on de Fine Licht and Brülde's work, allows us to clearly delineate trust from elements like competence, motivation, and opportunity. This methodological separation, while initially distinct, evolves into an integrated analysis in the empirical sections of our paper. This approach does not deviate from, but rather extends, our theoretical framework. We believe this clarification adds to the depth of our discussion on political trust and aligns with our goal of refining trust measurement in survey research. In the subsequent empirical sections of this paper, we examine how 'opportunity,' along with competence and motivation, associates with political trust, using data from the Swedish Citizens Panel data.

3. Measuring trust

According to our definition, A trust B to C when A judge that B is motivated, has the ability and the opportunity, to C (de Fine Licht & Brülde, 2021). This judgement is driven by perceptions of competence, motivation, and opportunity (i.e., the conditions) that makes B reliable within the domain of C. In other words, trust should be seen as posterior to some qualities. For a given B and C, we encode this logic in Fig. 1, where.

E is an experience term that informs A's evaluation. For example, it is common in the literature on trust to see connections being made between performance evaluations, perceived corruption or whether you are a political insider to ones level of trust (van der Meer & Hakhverdian, 2017). The experience term basically entails the information that A uses to arrive at certain trust statements. In this analysis, E is implicit but included in this discussion for the sake of completeness.

The terms {C, M, O} channel experiences through [c]ompetence, [m]otivation, and [o]pportunity into R, which is a mediating term holding the domain-specific perceived trustworthiness of an actor. There is a bi-directional edge between E and R to state that we cannot fully observe every shared aspect between these nodes. The final link between R and TR (trust) completes the model by relating the conditions to trust assessments. We include this last step, as we believe that the relationship between trustworthiness and trust is itself conditioned upon some decision-making process, although we do not pursue such an analysis here.

The point we are making stems from the fact that most measurements of trust simply bypass this causal structure by typically asking respondents for trust statements directly (i.e. "Do you trust …" (Seyd, 2016, p. 4);). The practice of doing so is here referred to as "direct measurement," and the items used in that approach are hereby referred to as the "typical" or "standard" items. Using a standard item, respondents are instructed to report the three reliance conditions on a collapsed scale, which bypasses the previously discussed theoretical mediating dynamic. Not only is this dismissive of elemental theoretical knowledge about the trust as a concept, it is also negligent towards potentially interesting empirical information about the intermediate steps, and, not the least, eventually also towards how to diagnose and treat decreases in global levels of political trust.

What does it mean to "bypass theoretical mediating dynamic?" For a concept like trust, that exhibits this structure, the use of direct measurement practices ultimately rely on the assumption that identical indicators (i.e. a survey item) also produce identical stimuli at the end of the survey respondents (Przeworski & Teune, 1966, 555; van Deth, 1998, 7–8). That is, for all kinds of trust instruments that appear identical on the surface, we must trust that they also trigger identical connotations among the respondents. One can imagine situations where this might not be the case. For example, what if different subsets of the

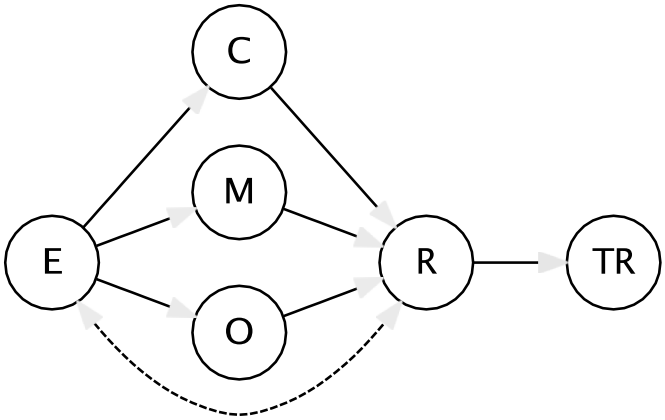


Fig. 1. Directed Acyclic Graph (DAG) of trust measurements.

respondents use different combinations of the trust conditions to arrive at similar levels of trust? If so, do these numbers carry the same meaning? Another issue is aggregation: what if a political institution is perceived as lacking the motivation but is firmly competent to do C? If so, how should these conditions be combined? By putting the burden on the respondents to interpret and "fill in the blanks," in ways that are hidden to us as researchers, we risk inviting issues of non-equivalence as identical indicators can connote different meanings (King et al., 2004; Levi & Stoker, 2000, p. 479).

Direct measurement of complex constructs thus hinges on equivalence in stimuli (van Deth, 1998, 7–8). That is, collapsing a multifaceted concept into a single statement or response, without tracing that process, will produce knowledge about the output but not about what generated it. For many, it might be sufficient to work with the output in its final stage. However, for anyone aiming at assessing how well these standard items actually capture the theoretical complexity, it is necessary to go beyond direct measurement in order to assess it.

3.1. Research question

Based on the conceptual analysis by de Fine Licht and Brülde (2021), we thus seek to provide a bridge between new theories about political trust and the typical indicators for measuring political trust. While those who work with the typical indicators rarely make use of the new theories beyond that of hypothetical discussions, the pioneers of new measures do not, to our knowledge, interact with the typical measures. We see merit in combining the two, by analysing the typical measures through the lens of novel theory.

Such an approach will allow for useful reflections concerning Fig. 1 and what can be said about the mediating dynamics of the antecedent conditions when employing direct measurement of complex constructs. If the typical trust items are used as measurements for the unobserved trust construct, then what are we capturing when using the direct measurement that skips substantially interesting steps of mediation? As Hamm and colleagues note in their introduction, scholars typically conceive the standard trust measures to capture the "many streams" of political trust (2019). That very issue is the guiding thought of this paper, and our research question seeks to answer what the typical trust measures capture by opening the black box to see "what is in" the typical political trust measure. Put differently: *To what extent can perceived competence, motivation, and opportunity account for variation in the standard single-item measure of trust in public authorities?*

4. Materials and method

4.1. Data

We use data from the online Citizens Panel at the SOM Institute, University of Gothenburg, Sweden, with 1760 respondents. The participation rate was 55 per cent, and the survey was in the field between December 3, 2020, to January 5, 2021. The sample was pre-stratified to mirror the Swedish population in terms of sex, level of education and age. The pre-stratification process yielded a sample characterized by a near-perfect gender balance, comprising 49.1 percent women and 50.9 percent men. Furthermore, the representation of individuals possessing a university education of three years or more stood at 28.8 percent, aligning relatively well with the corresponding demographic proportion in the Swedish population, which, as of 2020, was 22.6 percent among the age group of 16–74 years (Statistics Sweden).

Despite the pre-stratification efforts, an overrepresentation of elderly participants persisted in the sample. Specifically, individuals aged over 60 constituted 37.1 percent of the sample, exceeding the demographic composition of Swedish citizens in the same age bracket, which stood at 25 percent in 2020 (Statistics Sweden).

Another factor impacting representativeness pertains to political interest. Our analysis suggests a potential disparity, as the level of political interest within our sample is likely to be higher in comparison to the Swedish population. Findings from a representative cross-sectional Swedish postal survey conducted in 2020 indicated that 64 percent of respondents reported being either very or rather interested in politics (Sandelin, 2021). In contrast, within our sample, this proportion was 91.2 percent.

Despite pre-stratification, self-selection into the panel limits the accuracy in terms of point-estimations of, for example, trust in the different public authorities. However, since the aim of this paper is not to study the general political trust levels in the Swedish population, but rather the variation in survey responses across different authorities, we consider this type of sample to be sufficient. After the data was collected, respondents who did not supply responses to at least two agencies or had an item response rate below 80%, were dropped.

4.2. The case of Sweden and public agencies

We study trust and its conditions in relation to six Swedish public agencies: The So-cial Insurance Agency, (abbreviated as SIA), The Police authority (POA), The Con-sumer Agency (COA) The Public Health Agency (PHA), The Environmental Protection Agency (EPA) and The Gender Equality Agency (GEA). Within the Swedish admin-istrative system, there exist about 370 public agencies which operate in a somewhat autonomous fashion (Hall, 2015, p. 300). The agencies in our material are not selected

Randomly, but were picked in order to get variation in terms of duties, popularity, and top-of-mind. For example, many people are aware of what the Police do, whilst the duties of the Consumer Agency are less known. We also opted for variation in terms of the relationship between the citizens and the agency. In contrast to the other four authorities, the Police and the Social Insurance Agency are both examples of authori-ties that exercise formal authority: they arrest people or decide about welfare benefits, which can be a relevant factor according to previous research (Kumlin & Rothstein, 2005). Finally, we also wanted variation in the general level of trust. For example, previous studies show that many Swedes lack trust in the Social Insurance Agency but have high trust in the Police (Martinsson & Andersson, 2020).

In this paper, we interact with the literature on political trust. However, our list of actors does not include actors that are political in a representative way (e.g. politicians or parties). This needs to be addressed and clarified: the so-called output-side (the implementation of politics and political decisions) constitute one side of the political system and is thus of relevance to political trust (see the characterization in Hooghe, 2011; Marien, 2011; Rothstein & Stolle, 2008). Further, using actors in charge of implementation is fully compatible with the traditional definitions of politics, as the realization of policy to different degrees are not determined by politicians (cf. Harold Lasswell's famous definition of politics as "who gets what, when and how."). Finally, public agencies have a role to play in the somewhat influential framework on political support, being objects in the category of "confidence in regime institutions" (Norris, 2011, 23ff). Hence, although our list of actors is not exhaustive in any sense, it is still clearly relevant. It is important to keep in mind that we are not measuring political trust per se, but rather exploring how a novel (and general) theory aligns with common practice, i.e., with an application to the domain of political trust.

The bane of our approach is a credible account that makes it explicit that the conceptu-alization and measurement of different parts of the political system requires a different theory (i.e., our trust theory) for the different subset of actors that are relevant to polit-ical trust. That is, political trust cannot be conceived in the same way when referring to representative or implementing actors. This position can obviously be true, but we are not aware of such accounts. Hence, our study is informative of political trust, but it is not a study *about* political trust.

Furthermore, the Swedish sample establishes limitations on the generalization of the re-sults. Case selection logic help to establish the appropriate expectations. We approach this analysis as a hypothesis-

generating case study (Lijphart, 1975, p. 692) to inform fu-ture studies. Furthermore, the lack of a credible treatment mechanism dictates that all presented quantities should be understood as comparisons between groups, given the model presented.

4.3. Survey items

In the conceptual part of the article, we discussed that competence, motivation, and opportunity are reliance conditions. Our research question requires us to both have

Information about the conditions and to be able to directly assess trust. We have used a version of the standard survey item common in previous research (Durand et al., 2021) to gauge our respondents' self-reported political trust in an agency (referred to as "classical trust item" or "general trust item" throughout the text). For each of the six agencies, the respondents were asked to indicate their level of trust using a 7-point Likert-like scale with anchored end-points (1 = "very much," 7 = "very little"). In order to measure the perceived reliance conditions, we have used similar Likert-like scales running from 1 ("fully agree") to 7 ("not agree at all"). The item phrasing can be seen in Table 1.

In the empirical analysis, all items are reversed so that higher values imply more indicated trust, or higher perceived qualities. The total pool of items is $4 \times 6 = 24$. The order in which the agencies and trust conditions are presented to the respondents are randomized. In addition to this, we include information about whether a respondent is female (dummy), has obtained an advanced educational degree (dummy), left-right ideology (0–10) and continuous age in years. The total number of observations after removing rows with missing values for the key variables are 10,433. Across agencies, the number of observations is: SIA = 1746, POA = 1754, COA = 1741, PHA = 1749, EPA = 1735, and GEA = 1708. The individual "panels" for respondents are unbalanced with the majority having a full response (six in total) while we also analyze a few with only two observations.

In Table 2, we display summary statistics of the variables we treat as continuous. Age and Ltr (left-right) are only observed once per respondent, while the other ones are observed for every respondent-agency pair. Our dichotomous variable for *females* has a frequency distribution of 858 females and 902 males, and *advanced educational degree* has a distribution of 878 obtained and 882 not obtained.

Table 1
Item table.

Item	Phrasing	Categories	First	Last
General	How much trust do you have in the way in which the following authorities carry out their work?	7	Very much	Very little
Competence	Does [the agency] have the competence to carry out its work?	7	Fully agree	Not agree at all
Motivation	Does [the agency] have the motivation to carry out its work?	7	Fully agree	Not agree at all
Opportunity	Does [the agency] have the opportunity to carry out its work?	7	Fully agree	Not agree at all

Note: Survey items used in the analysis. The General item is the typical item and is used as the outcome variable. The phrasing column show how each item is presented to the respondents. The columns first and last show the anchor-phrase for the two endpoints of the response scale. The order in which the agencies and trust conditions was presented to the respondents where randomized. All 24 items are reversed in the analysis, to vary from low to high.

Table 2
Summary statistics of used data.

Variable	Mean	Median	SD	MAD	IQR	Min	Max
Age	52.97	54	16.23	19.27	26	18	85
Ltr	4.77	5	2.58	2.97	4	0	10
General	4.46	5	1.72	1.48	3	1	7
Competence	4.81	5	1.71	1.48	2	1	7
Motivation	4.90	5	1.68	1.48	2	1	7
Opportunity	4.45	5	1.60	1.48	2	1	7

Note: Abbreviations: SD (standard deviation), MAD (median absolute deviation), IQR (inter-quartile range), Ltr (left-right ideology). Age and ltr are only observed once per respondent, all other variables are observed once per respondent-agency pair. Number of observations: 1760.

In Fig. 2, we disaggregate the means (with standard deviations) and medians (with median absolute deviations) of the items used to measure trust and the conditions across each of the six agencies. The y-axis shows which agency and the x-axis is on the ordinal measurement scale. Both conditions and the general measures seem to cluster within each agency.

In Fig. 3, we present a frequency chart for the outcome per agency. Although the medians are similar across the agencies, their distributions show some differences in shape. In the next section, we proceed and describe our analysis.

5. Method

To analyze the data, we keep it in long format and use a cross-classified Bayesian general-ized linear mixed model with heterogeneous variance parameters across the agencies for ordinal outcomes (Alvarez & Brehm, 1995). Before fitting all models, we standardized the left-right ideology and age covariates. Before standardizing age, we first defined it as its natural logarithm. For the variables that vary across both respondent and agency (i.e. the trust conditions), they are first hierarchically centered at the level of the in-dividual (Jackman, 2009, 366). Hence, they represent deviations from the respondent

Mean for a given condition, defined over the agencies. We refer to these predictors as centered [condition] (i.e. centered competence and so on). These predictors are then standardized across the whole sample to have a mean of zero and a standard deviation of one. The respondent means for competence, motivation, and opportunity are also included to effectively generate the within-between formulation (Bafumi & Gelman, 2007; Bell & Jones, 2015). However, note that due to the high correlation between the respondent means for competence and motivation, we include these as one term. These are referred to as respondent-average terms. The two averages, competence-motivation and opportunity are, finally, standardized across the full sample.

We tested in total five models but focus our presentation mainly on one, which is suggested by information criterion (PSIS LOO-CV (Vehtari et al., 2017)), model precision, and posterior predictive model checks (Gelman et al., 1996). The complete set of results can be found in the results appendix and differences between the better performing models are not meaningfully different.[2] Informally, our model predicts a categorical response for the general reliance item through a cumulative ordinal regression with a linear predictor for both the conditional mean and the conditional standard deviation (Johnson & Albert, 1999). Thus, we predict differences concerning both the mean and the dispersion for

[2] For model 5, there are five observations flagged as potentially influential as their pareto k-weights are larger than 0.7. Looking at their observed values for these observations tell us that they defy the model by a) reporting low values for the (raw) trust conditions but still reporting higher values on the general trust item, or b) that they report low values for competence but still a higher value for the general item. A second aspect that speaks in favour of model 5 is that it contains the lowest amount of deviant data values.

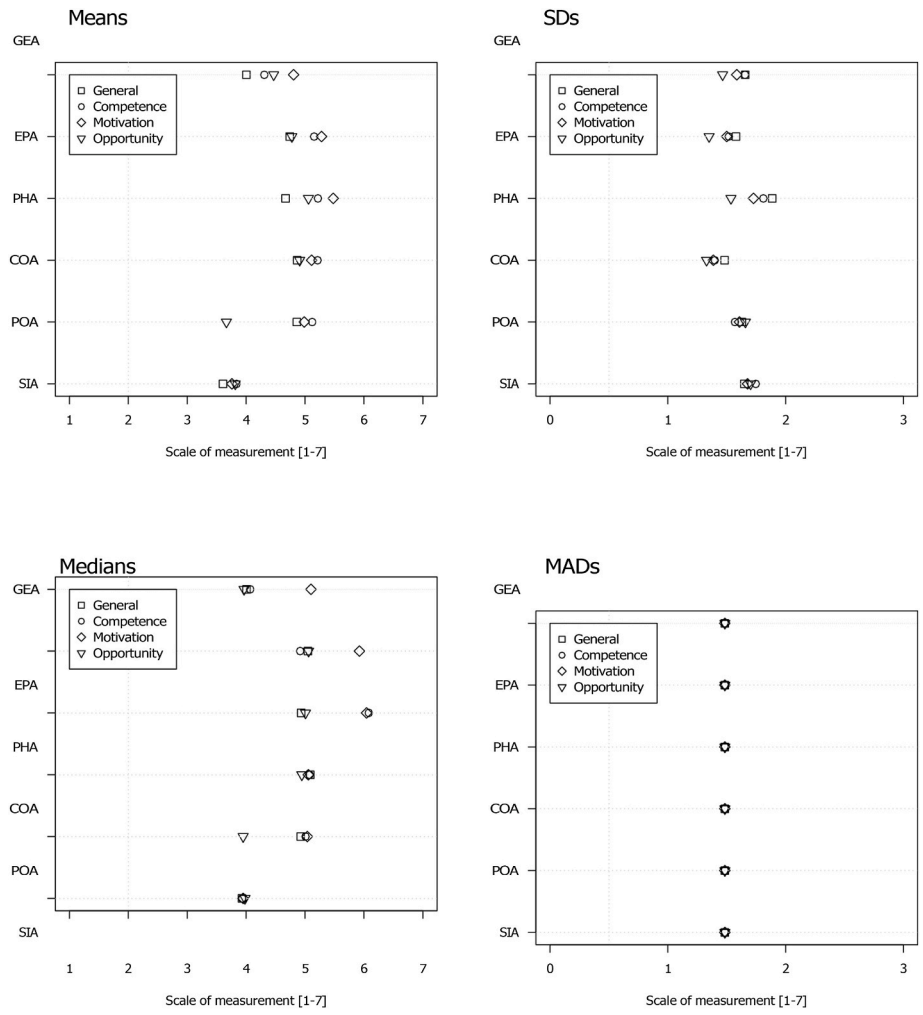


Fig. 2. Mean, standard deviation, median, and median absolute deviation for all trust items across all agencies.

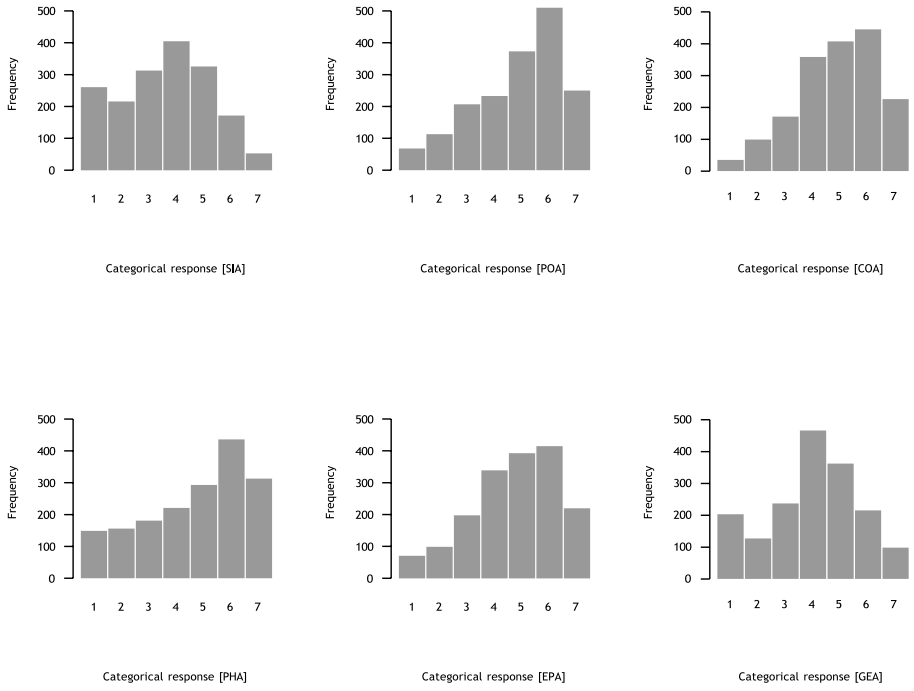


Fig. 3. Frequency of response for the general trust item across each agency.

the latent response. The conditional mean for respondent and agency at the nth row is a linear combination of.

- a population-level intercept;
- population-level regression estimates for the reliance conditions and individual covariates;
- varying intercepts for each respondent, partially pooled (Gelman & Hill, 2007, p. 245);
- varying intercepts for each agency, partially pooled (ibid.);
- group-level regression slope errors (across the agencies) for average competence-motivation, centered competence, and centered motivation, partially pooled (ibid.);

The conditional standard deviation is also modeled using partial pooling, where we assume a population-level standard deviation with agency-specific deviations (McNeish, 2021, p. 639). To calculate the categorical responses, the models also include a set of latent thresholds that cuts the latent response distribution into as many pieces as there are categories (Liddell and Kruschke 2018).

In Appendix A, we present out-of-sample prediction of unseen data. A complete motivation of the models can be found in the methods Appendix B along with a description of our prior distributions.

All models are estimated in Stan (Carpenter et al., 2017) using cmdstan (version 2.28.2) through cmdstanr (Gabry & Češnovar, 2022). The posterior distributions are approx-imated using the adaptive HMC algorithm (Hoffman and Gelman, 2014). We run four chains for 6000 iterations each and use the first 3000 samples for Stan's adaptation phases. We then thin the remaining samples by only keeping every third iteration. This results in $1000 \times 4 = 4000$ posterior samples to use for inference. Unless noted

Otherwise, the full posterior is used to perform inference. All models have been checked for signs of non-convergence and issues regarding the model.[3]

Beyond Stan and cmdstanr, all data manipulation, analysis, and presentation were per-formed using the following software: R (Team, 2021), posterior (Bürkner et al., 2022), bayesplot (Gabry & Mahr, 2022), haven (Wickham & Smith, 2022), stringr (Wickham, 2019), psych (Revelle, 2021), tibble (Müller & Wickham, 2022), extraDistr (Wolodzko, 2020), loo (Vehtari et al., 2020), scales (Wickham & Seidel, 2022), here (Müller, 2020), DiagrammeR (Iannone, 2022), tidyr (Wickham, 2021), dplyr (Wickham et al., 2021), magrittr (Bache & Wickham, 2022), knitr (Xie, 2021), rmarkdown (Allaire et al., 2022), bookdown (Xie, 2022), kableExtra (Zhu, 2021).

6. Results

In this section, we mainly present the results from our preferred model specification in terms of how well the reliance conditions predict variation in the general reliance outcome. We also present some by-products from our models that we think shed light on some interesting facts about measuring political trust. In Fig. 4, we plot the estimated intra-class correlation coefficient (ICC) for respondents from a model that does not include varying slopes but varying intercepts for respondents and agencies. This show how much of the unaccounted-for variance can be ascribed to unobserved individual factors. The dots

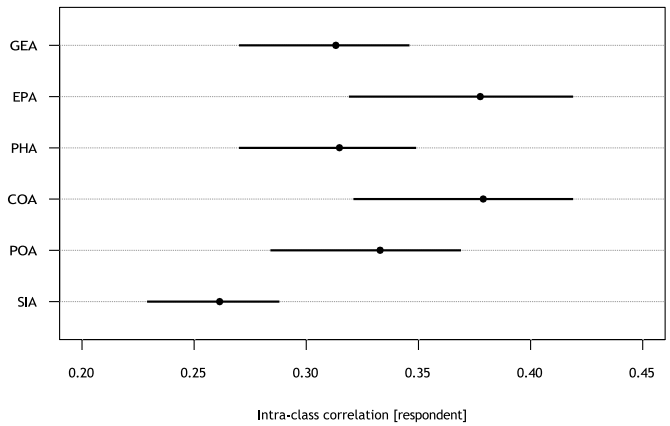


Fig. 4. Dotplot for intra-class correlation using the estimated variance terms from model 3.

are the posterior mean with 95% uncertainty intervals. Formally, we write it as:

$$ICC = \sigma_{\alpha}^2 \Big/ \left(\sigma_{\alpha}^2 + \sigma_{\xi}^2 + \sigma_{agency[n]}^2\right)$$

The ICC presented is the ratio of respondent error variance (σ^2) over itself added to the variance of the agency errors (σ_{ξ}^2), and the data level errors ($\sigma_{\text{agency[n]}}^2$) that are indexed over agencies (Williams et al., 2021).

The only thing that varies across each of the six estimates is the data level error for each agency. The most striking feature is that for SIA, unaccounted-for variance has to do more with unobserved agency factors. This arises from that the data level error for SIA is larger in comparison to the other agencies. This can suggest two things: 1) That the political actor ("B") can evoke information that is constructed irrelevant concerning trust; 2) that different actors within the same subset of actors (in our case, public administration/civil service) are unequally informative of the underlying construct.

In Figs. 5 and 6 we show estimates from our preferred model. The first two graphs have estimates concerning the agencies. To the left, we see the agency specific intercepts, and to the right we see the agency-specific scale parameters. The dots are indicating the posterior mean with 95% uncertainty intervals.

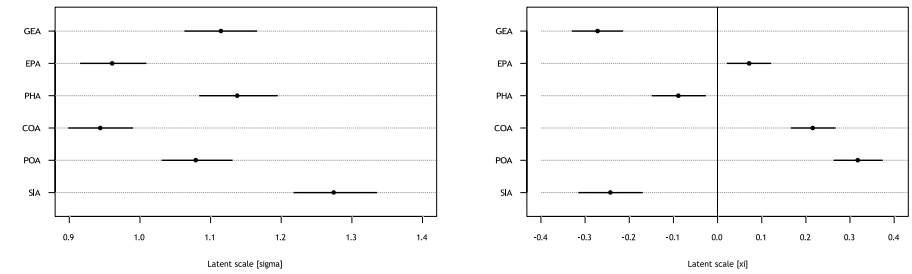
The response pattern for SIA is more variable (Fig. 6). That is, the latent response distribution for SIA is broader so that a wider range of reliance can result in the same predicted categorical response, especially when compared to EPA or COA, reflecting latent heteroskedasticity across the agencies (Mood, 2010). As a note, this is also why the ICC differ between the agencies. SIA is, alongside GEA, also estimated to receive punishment in terms of its location, given by its negative intercept (Fig. 5). This reflects a negative weight for the two. Compare this to POA or COA, which both receive a premium in terms of their location. That is, if the same respondent were to indicate her trust in GEA and POA, the latter would have a higher probability of higher response.

Fig. 7 show the posterior mean and 95% intervals for the population-level regression estimates. The first five rows (from the top) hold the centered and average terms for the reliance conditions. Although all can be seen as credibly positive in influencing the response, it is centered competence (0.61[0.59, 0.64]) and the competence-motivation

Average (0.84[0.79, 0.89]) predictors that stands out as being important. The other re-liance estimates are located between 0.1 and 0.2. We substantiate what these estimates imply on a practical level later.

The other covariates are not of interest to us but are mostly included to bolster exchange-ability. Nonetheless, the model predicts that respondents who identify themselves as being more to the right, are also less probable to respond in a higher category, com-pared to a respondent that identifies more to the left but is similar otherwise. The other terms

[3] For all models, all chains, and all parameters, potential scale reduction factor are lower than 1.01 and effective sample size (rank normalized bulk and tail-based) are sufficient. Visual inspection of key parameters using trace plots (fat and caterpillar of multiple stationary chains), rank plots (close to uniform), and density plots (smooth and unimodal) show sufficient patterns (Cowles, 1996; Vehtari et al., 2021). For the runtime warnings thrown by Stan, there are no divergent transitions reported and no indications of low BFMI that can indicate posterior problems (Lambert, 2018, p. 406ff; McElreath, 2020, p. 278ff). Further, there are no efficiency warnings thrown.



(a) Group-level standard deviations of the response (b) Agency-specific intercepts

Fig. 5. Dotplot for parameters.

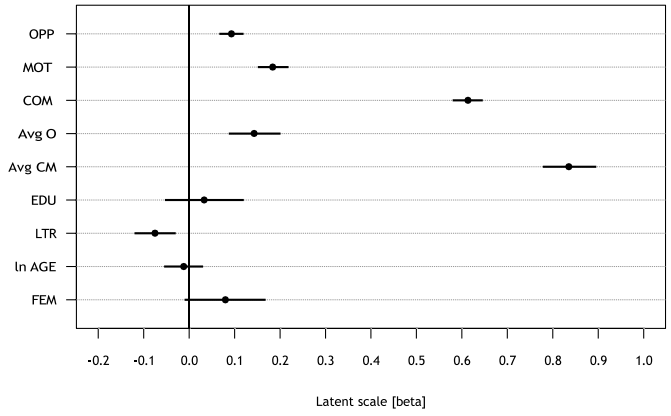


Fig. 6. Dotplot for population-level regression coefficients from model 5.

have intervals overlapping zero.

Our model also included agency-specific errors for three reliance terms, which can be seen in Fig. 7. Each agency has three slots on the y-axis, one per parameter, the dots are the posterior mean with 95% uncertainty, and the coloured rugs at the top show

The population-level posterior distributions for each of the parameters. See the legend for details. The figure shows two interesting patterns: The group-varying parameters (after being shifted by the population estimates) for centered motivation concerning GEA, EPA, and PHA are small, being close to zero for all three and even overlap zero for GEA; for the other agencies, their parameters are pushed upwards, having a higher impact on the linear prediction for the conditional mean. For centered competence, the group-level parameters are polarized for PHA and COA: for the former, the estimate is pushed upwards as the competence-motivation average predictor. For COA, the estimate is pushed downwards being equal in size to the motivation predictor. The other agencies seem to be well covered by the population parameter. Group-level estimates for the average competence-motivation show some scatter but nothing very dramatically.

7. Discussion

This study gives us reasons to believe that it exists an intricate dynamic between competence and motivation in shaping political trust, underscoring the multifaceted nature of trust in public institutions. With reference to these results, we suggest that the standard measurement of political trust predominantly retrieves.

1. General perceptions that are stable within respondents of political actors being either competent or motivated;
2. Perceptions of competence, which can vary across political actors for each respondent.

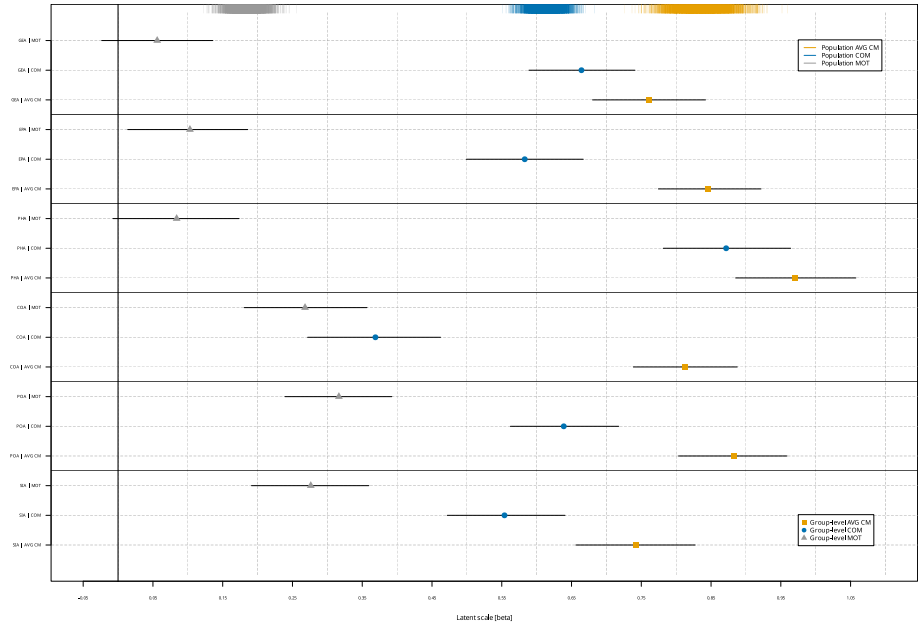


Fig. 7. Dotplot for group-level slopes for some trust conditions.

However, we found no support for the idea that opportunity had any significant effect on people's trust in public agencies. This is an interesting finding and worth examining at length elsewhere because, for A to trust B to C, A needs to judge that B has the opportunity to C. Otherwise, B *could* not C, and hence the attitude of trust would be defeated, which was not found in our empirical materials. There are many directions to pursue with such results. One is to assume that opportunity, however intuitive, has no place in political trust in practice, even though we might have good theoretical reasons for including this condition in the definition of political trust. It might be the case that at the interpersonal level, opportunity is relevant, but on a political level, it is not.

Concluding negatively from this single study we believe is premature, however. There are at least three reasons why the opportunity condition could still be relevant, even if it was not so in our study. First, there could be issues with validity. In our attempt to measure three-place trust, where A trusts B to do C, we may unintentionally have assessed two-placed trust, where A simply trusts B. This is significant because two-place trust omits the 'opportunity' aspect, potentially explaining the lack of significant effects related to the opportunity condition in our findings. Additionally, when we asked participants about their trust in public agencies performing their duties, the responses might have reflected a general perception of trustworthiness, rather than trust in these agencies to accomplish specific tasks. Therefore, for an accurate assessment of three-placed trust, a more precise focus on the 'C' aspect is essential, differentiating it from the broader, two-place trust.

Second, the term "opportunity" might mean different things to different people and may have different meanings in various contexts. Therefore, we encourage researchers to investigate the sociology of opportunity. One way forward is to better understand what opportunity means to people, to facilitate its measurement. For instance, opportunity might relate to economic or other resources, where distrust in the government's provision of healthcare might stem from a perceived lack of resources, such as money and personnel. Or distrust in the government's ability to implement large-scale affirmative action programs could arise from legal constraints and the difficulty in changing relevant laws.

Third, interpreting our results, respondents seem to make a distinction between "internal" qualities (competence and motivation) and "external" opportunity, even though this did not impact levels of political trust in our study. However, since this distinction is made, it is possible that people already 'factored in' opportunity in their judgment in a way that is difficult to detect with our current study design. For example, politicians decide on the economic resources or methods that the police can use to fight crime. This establishes a relationship between the opportunity condition for the Police and the motivation condition for relevant policymakers, supporting a network-based view of political trust. That is, part of A's trust in an authority B1 depends on A's perception of another authority B2, who might or might not delimit the opportunities of B1.

Finally, the finding that average competence-motivation and centered competence are the stronger predictors can both suggest that political trust has more than one modus. Hence, political trust can operate as both a fundamental characteristic of a person, as well as a more dynamic evaluation of political events that reflects social learning (Glanville & Paxton, 2007). Our current analysis cannot speak to this issue further, but this logic is and should continue to be fruitful avenues for future research (e.g., de Blok, van der Meer, & Van der Brug, 2020). Nevertheless, this study put some of the theories and measurements of political trust into doubt. It seems to be problematic to collapse all actors on the output-side of the political system into one (Rothstein & Stolle, 2008), or to just ask about respondent confidence in the civil service (e.g., World Value Surveys).

There is thus a reflection to be made concerning how much aggregation can be made concerning the clustering of actors into "parts" of a political system. Consequently, future measurement approaches should make explicit assumptions about the interaction between the political actors used and how they might interact with the survey-response process. To say the least, they are most likely not empty vehicles that probe attitudes in a vacuum. In measurement terms, they are potential bringers of non-equivalent survey items that can undermine scale construction and thus analysis (Borsboom, 2006). Which, as Hare and colleagues put it, "can obscure, rather than illuminate, the true nature of the political world" (Hare et al., 2015, 759).

8. Limitations

One notable strength inherent in the present study lies in its empirical exploration of the dimensionality of trust—a subject warranting heightened research scrutiny. Nevertheless, the investigation is not without its limitations. Primarily, a limitation surfaces concerning the extrapolation of findings to diverse contexts. Sweden exhibits notably high levels of trust in authorities. However, it is plausible that the dynamics of the various trust dimensions operate distinctively when shaping overall trust in a society characterized by lower levels of trust. We thus encourage future research endeavors to delve into the role of trust dimensionality within contexts characterized by low levels of trust.

Another limitation pertains to the utilized dataset. As was shown in the Data section, the study leverages data procured from an online panel, rendering the respondents imperfectly representative of the Swedish population. To mitigate potential biases, we pre-stratify the sample based on educational attainment, gender, and age. Despite pre-stratification on these variables, the results we draw are based on a sample where the level of political interest is likely to be higher than in the Swedish population in general, which is something to keep in mind when drawing conclusions.

A third limitation emanates from the cross-sectional design adopted in this study, rendering causal inference unattainable. Theoretically positing that the three trust dimensions—competence, motivation, and opportunity—exert influence on the overarching assessment of authorities, we advocate for future investigations that transcend mere correlation. For instance, the manipulation of trust dimensions through experiential interventions (e.g. via scenario vignettes) could facilitate an examination of the causal impact of these dimensions on the comprehensive evaluation of trust.

9. Concluding remarks

The aim of this study was to explore the dimensionality of trust in in six different Swedish public authorities. More specifically, we addressed the question of whether perceived competence, motivation, and opportunity account for variation in the stan-dard single-item measure of trust in public authorities. The purpose of this endeavor was to contribute to knowledge necessary for the refinement of indicators of trust in survey research.

By regressing the typical direct measurement of the construct, using theoretically moti-vated psychological antecedent conditions, the results imply that respondent-averages of perceived competence and motivation (between-comparisons), as well as perceived com-petence as measured deviance from the respondent average (within-comparisons) that produce changes in the predicted conditional probability of selecting higher categories. Thus, when we explore the dimensionality of trust in Swedish authorities, we mainly found support for the influence of the competence dimension, and to some extent also the motivation dimension. However, as pointed out in the discussion, this finding may be the result of how we measure general trust. Possibly, the role of the opportunity dimension will play a more important role in shaping general trust, if C is specified in a clearer way. This points to the importance of integrating theoretical work on trust with considerations from survey methodology and survey questionnaire design.

It is well-established that survey data, in general, have two main categories of errors: representation and measurement (Groves & Lyberg, 2010). In this analysis, we have approached the political trust literature

from the latter angle. We believe that improve-ments in measurement instruments are one important building block towards more credible research (Flake & Fried, 2020). This is not only important for purely aca-demic purposes but also aligns closely with policy-relevant needs to better understand the drivers of trust (Brezzi & et al., 2021).

Looking ahead, we see at least two major venues for future research. First, this analysis has leveraged variance in the psychological ante-cedents of trust. This effectively nudges this analysis towards two-placed trust as the C is held in vague terms ("to carry out its work"). However, the C that A relies on B to do, can have implications for both how reli-ance relates to other constructs (e.g. policy support) and also for the cognitive yardstick that A uses to evaluate B (e.g. difficulty of the task, importance of the task, cost of failure, etc.). Further, a more systematic approach to the sampling of different B's should also be of interest. If C and B are selected in order to represent a configu-ration of a policy network, it should be possible to derive networked measures of A's trust in a set of B's that are to achieve a common C. Hence, a more systematic and design-based approach to B and C will generate interesting insights (Keele, 2015).

A second venue is a more systematic item-generating process, which should be as theo-retically anchored as possible, and follow a deductive logic (Hinkin, 1998). As an illus-trative suggestion, one could interact the conditions for trust with the four components of problem-solving capacity from Lodge and Wegrich (2014, 10ff): delivery, coordina-tion, regulatory, and analytical. This would generate a pool of items that relate the trust conditions to different aspects of political problem-solving (i.e. competence to implement, motivation to imple-ment, opportunity to implement, and so forth).

Data and software availability

The data underlying this article cannot be shared publicly due to compliance with GDPR and the terms that the research subjects have accepted. However, the data will be shared on reasonable request to Oskar or Björn. Sharing data may require approval from the Swedish Ethical Authority.

All software used to produce the dataset will be shared upon a request to the corresponding author (Oskar).

CRediT authorship contribution statement

Oskar Rydén: Writing – original draft, Visualization, Software, Methodology, Investigation, Conceptualization. **Karl de Fine Licht:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Björn Rönnerstrand:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Niklas Harring:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Bengt Brülde:** Writing – original draft, Methodology, Conceptualization. **Sverker C. Jagers:** Writing – review & editing, Writing – original draft, Supervision, Funding acquisition, Conceptualization.

Declaration of competing interest

All authors listed on this submission declare that there are no conflicts of interest present.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssaho.2024.100885.

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