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## Are We All Equally Persuaded by Procedural Justice?

### Re-examining the Invariance Thesis Using Longitudinal Data and Random Effects

Jose Pina-Sánchez · Ian Brunton-Smith

**Abstract** A growing number of empirical studies has sought to explore differences in the effectiveness of the procedural justice model across people. Much of this new evidence points at the procedural justice association with both legitimacy and compliance being largely invariant. Here we expand the analysis of this procedural justice ‘invariance thesis’ by introducing a novel life-course perspective to the debate. Specifically, we focus on the variability of the procedural justice effect within individuals across time. To do so, we use mixed effects structural equation models and longitudinal data from a sample of 1,354 young offenders in the US reporting perceptions of the police, and a sample of 511 subjects of the Australian general population reporting on the tax authority. We find the procedural justice within-person association with legitimacy to be highly variant across individuals, which can be negative for more than 10% of subjects in the two samples used, while for at least another 11% of participants the relationship is twice as strong as the average or stronger. We also find variability in the within-person association with compliance, however this is only the case for a specific measure of procedural justice in the sample of young offenders. These results question the ‘invariance thesis’. Compliance, and especially perceptions of institutional legitimacy, cannot be expected to change uniformly across all subgroups of the population in line with their perceptions of the procedural just actions of those institutions.

**Keywords** Procedural justice · invariance thesis · police · tax authority · longitudinal data

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## 1 Introduction

There are few subjects more fundamental to social scientists than understanding law-abiding behaviour. Multiple theoretical frameworks have been proposed, enjoying varying prominence across time. One that has crossed disciplinary boundaries, growing steadily in influence since the 1990s, is the procedural justice paradigm (Tyler, 1990). This paradigm extends ideas first developed by Weber (1968) on the role that institutional legitimacy plays in ensuring voluntary compliance by adding the concept of procedural justice; identified as a key precursor of both legitimacy and compliance.

Procedural justice can be understood as the perceived fairness in the decisions adopted by a particular institution, but also the perceived fairness in how this institution interacts with subjects under its authority. The concept was introduced into socio-legal research by Thibaut and Walker (1975, 1978), who differentiated it from distributive justice, to be understood as the fairness of the actual decisions executed by that institution (Elliott et al., 2011). *“In other words, it [procedural justice] relates to how a person may perceive the interpersonal treatment they have received from an authority, regardless of whether the resulting outcome will be favourable or not”* (Murphy et al., 2009, p. 2). Tyler (1990) further highlighted how the direct effect that procedural justice exerts on compliance is strongly mediated through an indirect effect of procedural justice on legitimacy. To put it simply, institutions that enjoy high levels of voluntary compliance are those that are seen as legitimate, a characteristic that can be enhanced if such institutions treat those under their authority fairly and respectfully.

A large body of evidence has been gathered over the last three decades corroborating the positive effect of procedural justice across different institutions. Most research on this topic has focused on perceptions of police processes (see for example Baz and Fernández-Molina, 2018; Gau et al., 2012; Murphy, 2015), where positive associations with legitimacy, trust, compliance or collaboration have been consistently reported (Walters and Bolger, 2019). Similar positive associations have also been found for outcomes and processes delivered by a wide range of different institutions, such as courts (Baker et al., 2015; Levi et al., 2009; Tyler and Rasinski, 1991), prisons (Beijersbergen et al., 2015; Brunton-Smith and McCarthy, 2016), tax authorities (Hartner et al., 2008; Levi and Sacks, 2009; Murphy, 2003), legislative bodies (Gangl, 2003; Tyler, 1994; Tyler et al., 1989), social security offices (Murphy et al., 2009), schools (Abdelzadeh et al., 2015), or even invading forces (Fischer et al., 2008).

The success of Tyler’s model has also been reflected more recently by its international expansion, with a growing number of studies exploring its applicability outside the Anglosphere (Bradford et al., 2014; Jackson et al., 2014; Sun et al., 2017). These studies corroborate the positive effects attributed to procedural justice, even if most point at relatively weaker associations relative to other instrumental considerations - than what was reported in studies based in the US, the UK or Australia. At the same time another group of studies has explored differences in the effectiveness of the procedural justice model across contexts and subgroups of the population within - rather than between - countries (Brown and Reisig, 2019; Murphy, 2017; Wolfe et al., 2016).

Most notable amongst this last group of studies is Wolfe et al. (2016), who set out to examine the universality of the procedural justice model, or as they call it, the ‘invariance thesis’, using survey data on attitudes towards the police in the South-east of the US, and a set of ten individual and area level factors. Only one of the factors considered, previous victimisation, was found to amplify the positive relationship between procedural justice and trust in the police, while the relationship between procedural justice and reported ‘obligation to obey’ was not moderated by any of them. These results led the authors to conclude that *“Tyler’s process-based model is a ‘general theory of individual police legitimacy evaluations”* (Wolfe et al., 2016, p. 253). A conclusion that has been further corroborated in a series of recent studies: Brown and Reisig (2019) noted that the gender of an agent does not mediate the relationship between procedural justice and police legitimacy;

Walters and Bolger’s (2019) meta-analysis of 64 criminal justice studies (and 95 samples) found that neither the country, nor the average age or gender of the sample moderated the procedural justice relationship with legitimacy or compliance; while Zahnw et al. (2019) corroborated the largely invariant effect of procedural justice after replicating - and expanding - Wolfe et al.’s (2016) research design for the context of Australia.

We believe, however, that Wolfe et al.’s (2016) conclusion is not yet warranted. In spite of this new evidence in support of the invariance thesis, the literature on the matter is still contradictory. There is ample evidence documenting different procedural justice effects across subgroups of the same population (Bradford, 2014; Huo, 2003; Murphy and Cherney, 2011a), even if the direction of those effects is not clear. In addition, following Wolfe et al.’s (2016) publication, a series of new studies have specifically tested and rejected the invariance thesis. For example, Murphy (2017) recently demonstrated how low levels of trust could not only moderate the effectiveness of procedural justice on feelings of obligation to obey the police, but even turn it negative. That is, rendering procedural justice in certain cases not just less effective but counter-productive. See also the weaker associations between procedural justice and legitimacy observed by Reising et al. (2020) in high-crime neighbourhoods.

Perhaps more importantly, the methods used to examine the invariance thesis - namely testing the significance of interaction effects or assessing differences in models estimated separately for different subgroups of the population - appear suboptimal. Such approaches can only examine the presence of potential variability associated with a finite - often narrow - set of pre-defined factors, which inevitably provides an incomplete view of the question. More so if we take into consideration that the inclusion of an increasing number of interaction effects quickly leads to problems of multicollinearity, while modelling different demographic subgroups separately requires partitioning the sample, with a subsequent loss of statistical power. Lastly, by relying on cross-sectional data, previous work on the invariance thesis has missed the developmental aspect of the procedural justice model (Kaiser and Reising, 2017).<sup>1</sup> This represents an important gap in the literature since, by definition, the procedural justice model is a process-based model, and as such its effects - and any variability around them - should be manifested across time.

Here we seek to re-examine the invariance thesis using an alternative approach based on longitudinal data and mixed effects structural equation models. Our approach offers three key advantages. First, by differentiating *within* from *between* subject effects, we can examine the effect of procedural justice across time (Curran and Bauer, 2011), while eliminating any time-constant unobserved heterogeneity (Bell and Jones, 2015; Hamaker and Muthén, 2019), and in so doing contribute to partially adjust for the third common causes bias (Nagin and Telep, 2017; Pina-Sánchez and Brunton-Smith, 2020). Second, by introducing random slope terms for the within-person procedural justice associations with legitimacy and compliance we are able to estimate the overall variability of such associations across subjects, which provides an alternative, life-course-centred, test of the invariance thesis, a test that is not restricted to a set of pre-defined factors. Third, by regressing the random slope terms on those a priori relevant factors we can explore their potentially moderating effect, which will be crucial to identify those instances and groups of the population where procedural justice appears most - and least - effective.

To enhance the external validity of our study we use two different samples referring to perceptions of the police amongst young offenders in the US, and perceptions of the tax authority amongst subjects of the Australian general population. The data and methods employed are discussed in more detail in Section 3, but before presenting them we first review some of the literature where the relationship between procedural justice with legitimacy and compliance has been shown to vary

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<sup>1</sup> See also Lee et al. (2011) and Fine and Cauffman (2015) where the focus is on differential developmental trajectories of legitimacy and legal socialization

significantly across subjects. This brief review serves two purposes: to illustrate how there is probably more evidence refuting the invariance thesis than has been commonly acknowledged; and to identify the factors that have been found to moderate the effect of procedural justice and the rationales that have been put forward to explain them.

## 2 Evidence Challenging the Invariance Thesis

Studies exploring the variability of the effect of procedural justice within countries have considered differences based on socio-demographic characteristics, reported attitudes, behaviours, or contextual factors. Probably the factor most commonly explored is subjects' identification with an authority, or the social group it represents, with "*procedural justice being potentially less effective for those who have a weak identification with mainstream groups and institutions*" (Murphy and Cherney, 2011a, 252). Attempts of authorities to engage with these groups may be judged with suspicion and distrust (Murphy and Cherney, 2011b).

Using Australian survey data and interaction effects Murphy and Cherney (2011a) found that the relationship between procedural justice and citizen cooperation with the police is weaker amongst ethnic minorities. Murphy and Cherney (2011b) further demonstrated how the relationship between procedural justice and cooperation with the police could even be negative amongst minority groups that expressed low 'law-legitimacy' - understood not as the legitimacy of authorities per se, but the legitimacy of the laws and rules authorities enforce. Using a similar survey of the general population, also from Australia, Murphy et al. (2015) found that the association of procedural justice with intentions to cooperate with the police was weaker amongst those who identified strongly with their own culture as opposed to the superordinate Australian culture. This finding corroborates Huo (2003) in the context of contacts with the police and criminal courts, who found a stronger association of procedural justice with compliance amongst those who identified with the superordinate American group. Other studies have found similar disparities in the relationship of procedural justice with legitimacy. Using a sample of young Londoners, Bradford (2014) found a stronger procedural justice association with police legitimacy amongst participants who identify as from the UK than for those who do not.

Yet, the negative moderating effect attributed to minorities and disenfranchised subgroups of the population is not entirely clear, with another group of studies finding the opposite effect. Based on survey data from New York, and replicating the same model for different ethnic groups, Sunshine and Tyler (2003) showed that the positive relationship between procedural justice and police legitimacy was substantially larger amongst African Americans and Hispanics than for whites. Using a similar modelling approach and a sample of female offenders from Florida, Baker et al. (2015) showed that the association of procedural justice with perceptions of obligation to obey the law was higher amongst minorities than white inmates. Whilst Murphy et al. (2018) found that the association of procedural justice with deciding whether to report information to the police was stronger amongst Muslims living in Australia who feel stigmatised than those who do not. The authors attribute this finding to 'status insecurity' suggesting that "*[...] those who experience greater feelings of status insecurity will be particularly sensitive to signs that they are being treated with procedural justice by group authorities.*" Murphy et al. (2018, p.4). They also highlight the potential importance of 'expressive harm', arguing that "*[...] members of society who feel ongoing discrimination or unfair treatment from authorities will be more sensitive to signs they are being treated unjustly by those authorities*" (ibid). These interpretations make sense, but it is not obvious how they can reconcile findings where procedural justice seemed less effective across ethnic minority groups. In any case,

regardless of the direction of the effect, the evidence presented here consistently challenge the view of procedural justice as a uniform model.

Age is another factor where significant yet contradictory moderating effects have been detected. Using the first waves that became available from the Pathways to Desistance longitudinal study (Mulvey, 2016), Fagan and Piquero (2007) suggested that the relationship between procedural justice and legitimacy amongst young offenders becomes stronger through time. However, using the complete dataset and a more restrictive measure of procedural justice McLean et al. (2019) found the opposite effect, one of a weakened association with legitimacy as individuals aged. Using data from the same study, Augustyn (2015) found that the relationship between procedural justice with the frequency of offending (as a measure of compliance) was significant amongst adolescent onset offenders, but not amongst earlier offenders.

Other factors that have been shown to moderate procedural justice are previous convictions, victimisation, contacts with the authority, community connections, community norms, and law-legitimacy. Baker and Gau (2018) showed that the relationship between perceived police procedural justice and obligation to obey the law was stronger for female offenders without previous convictions. By contrast, Wolfe et al. (2016) found that previous victimisation amplified the positive relationship between procedural justice and trust in the police. Zahnow et al. (2019) found that same relationship strengthened for those that have had previous contact with the police. And Antrobus et al. (2015) showed that procedural justice association with individuals' obligation to obey the law was stronger amongst those who 'belonged' to a fewer number of communities, and for those who perceived weaker community support of police legitimacy.

This particular moderating effect for community support of police legitimacy resonates with Murphy et al. (2009), who using Australian survey data in the context of policing, taxation and social security, found that procedural justice was more strongly associated with shaping compliant behaviour amongst citizens who question the legitimacy of the law. Drawing on Braithwaite's work on motivational postures in the domain of tax compliance, this effect was attributed to subjects who question the legitimacy of the law placing greater distance between themselves and the regulator, making the potential gains from procedural justice larger. Braithwaite posits that citizens adopt different postures in their interactions with an authority, and that individual postures can be modified through time depending on the nature of those interactions. Using Australian survey data Braithwaite (2009b, 2013) and Braithwaite and Reinhart (2007) show how procedural justice can be used to flip individual 'resistance' into 'compliance', but that it is ineffective in turning those who choose to 'disengage' from the regulatory authority.

There is, then, considerable evidence challenging the invariance thesis. We can identify significant differences across subjects based on behavioural, demographic, community and life-course factors. Yet, few studies have explored variability across similar sets of factors - hindering overall assessments on the robustness of the evidence - and when they have, findings can be contradictory. More importantly, we still lack a general understanding of the extent to which the procedural justice model varies across subjects. By specifying interaction effects, or partitioning samples based on demographic characteristics, we can only explore that share of the - assumed - variability in the effectiveness of procedural justice that is associated with a limited set of factors. This will inevitably miss much of the overall variability across subjects. Lastly, none of the studies on the subject have yet examined the extent to which the effect of procedural justice varies across time.

### 3 Current Study

We use data from two longitudinal studies: the Pathways to Desistance (Mulvey, 2016) and the Australian Tax System Surveys (Braithwaite, 2009a).<sup>2,3</sup> These two datasets share some important similarities: (i) capture subjective perceptions of procedural justice using multi-item questionnaires; (ii) provide repeated measurements on the same subject across time; and (iii) have been repeatedly used in the procedural justice literature (see Piquero et al. 2005, Kaiser and Reisig 2017, or Walters 2018, amongst studies that have employed Pathways to Desistance data, and Braithwaite 2013, or Hartner et al. 2008, for studies based on the Australian Tax Systems Survey). The two datasets also complement each other, covering perceptions of the police and the tax authority, two of the most common institutions where the procedural justice model has been explored.

Data from the Pathways to Desistance study is composed of 1,354 adolescents from Philadelphia and Maricopa County, contacted from November 2000 to March 2003 following guilty verdicts or charges for serious offences in the juvenile and criminal court systems in the two jurisdictions. Participants were fourteen to eighteen years old when contacted for the first time, with face-to-face interviews taking place shortly after their adjudication/conviction. Participants were reinterviewed at six-month intervals for a period of three years, and one-year intervals for the following four years, resulting in eleven waves spread across seven years. Attrition rates were kept low, with a remarkable 84% of the original sample (1,134 participants) being successfully re-interviewed in the last wave of the study. To maintain consistency across interview intervals we restrict our analysis to the first seven waves of the study.

The Australian Tax System Surveys is composed of three different self-completion surveys (the ‘Australian Tax System – Fair or Not’, the ‘Community, Hopes, Fears and Actions’, and the ‘How Fair, How Effective’ survey) based on the same sample of participants from the Australian general population. The first wave achieved a response rate of 29% from the 7,750 individuals initially contacted, with further substantial attrition through waves two and three. Data is available for a total of 511 subjects with complete information across each of the three survey waves. To compensate for item-missing data in the Pathways to Desistance and the Australian Tax Systems Surveys, a full information maximum likelihood approach is used, under the assumption that data are missing at random (Rubin, 1987). Descriptive statistics for the variables used in the study are shown in Table 1.

#### 3.1 Procedural Justice

The Pathways to Desistance study operationalises police procedural justice through a set of nineteen questions - adapted from Tyler (1990) and Tyler and Huo (2002). Most of those questions use a five-point Likert scale, ranging from ‘*strongly disagree*’ (1) to ‘*strongly agree*’ (5), reverse coded when expressed in negative terms. The specific questions used can be found on the Pathways to Desistance website at the University of Pittsburgh.<sup>4</sup>

Existing studies have normally aggregated all nineteen items, with higher values of the resulting mean score representing higher perceptions of procedural justice. This is, however, a suboptimal approach as it wrongly assumes that each of the items used tap equally into the underlying construct (Pina-Sánchez, 2014) and that the measurement process does not change across time (Widaman

<sup>2</sup> Data from the Pathways to Desistance can be accessed here, <https://www.icpsr.umich.edu/icpsrweb/NAHDAP/studies/29961>, further documentation on the study available here, <https://www.pathwaysstudy.pitt.edu/index.html>.

<sup>3</sup> The Australian Tax System Surveys dataset and relevant meta-data can be found here, <http://legacy.ada.edu.au/longitudinal/browse/australian-tax-system-surveys-2000-2005>.

<sup>4</sup> [http://www.pathwaysstudy.pitt.edu/codebook/docs/Question%20text\\_Procedural%20Justice\\_followup.pdf](http://www.pathwaysstudy.pitt.edu/codebook/docs/Question%20text_Procedural%20Justice_followup.pdf)

**Table 1** Descriptive statistics.

|  | Mean  | Std. deviation | Min. | Max.   |
|--|-------|----------------|------|--------|
| <i>Dataset 1 - Pathways to Desistance</i>      |       |                |      |        |
| <i>Level-1 (subject-wave) N = 14894</i>        |       |                |      |        |
| Procedural justice (treatment)*                | 2.83  | 0.39           | 1.75 | 4.25   |
| Police treat males and females differently **  | 3.41  | 1.00           | 1    | 5      |
| Police treat differently depending on age **   | 2.58  | 0.99           | 1    | 5      |
| Police treat differently depending on race **  | 2.78  | 1.04           | 1    | 5      |
| Police treat differently by neighbourhoods **  | 3.44  | 1.01           | 1    | 5      |
| Procedural justice (voice) **                  | 2.29  | 1.01           | 1    | 4      |
| Legitimacy*                                    | 2.36  | 0.45           | 1.10 | 3.60   |
| I have a great deal of respect for the police  | 2.10  | 1.02           | 1    | 4      |
| I feel proud of the police                     | 1.94  | 0.94           | 1    | 4      |
| People should support police                   | 2.28  | 1.00           | 1    | 4      |
| Police hold suspect until evidence to charge   | 2.14  | 1.07           | 1    | 4      |
| Offending (non-compliance)                     | 51.66 | 97.88          | 0    | 900.63 |
| Age  | 16.04 | 1.14           | 14   | 19     |
| Exposure to violence                           | 0.43  | 0.45           | 0    | 3.5    |
| Community support                              | 6.28  | 1.29           | 0    | 8      |
| Laws are meant to be broken                    | 2.11  | 0.74           | 1    | 4      |
| Picked up and accused by police                | 4.48  | 1.50           | 0    | 6      |
| <i>Level-2 (subject) N = 1354</i>              |       |                |      |        |
| Female   | 0.14  | 0.34           | 0    | 1      |
| Foreign born                                   | 0.06  | 0.24           | 0    | 1      |
| Black  | 0.41  | 0.49           | 0    | 1      |
| Hispanic                                       | 0.33  | 0.47           | 0    | 1      |
| Other ethnicity                                | 0.05  | 0.21           | 0    | 1      |
| <i>Dataset 2 - Australian Tax Authority</i>    |       |                |      |        |
| <i>Level-1 (subject-wave) N = 1533</i>         |       |                |      |        |
| Procedural justice*                            | 3.64  | 0.84           | 1    | 5      |
| Tax office accountable for what they do        | 3.39  | 1.09           | 1    | 5      |
| Tax office treating you fairly and reasonably  | 3.72  | 0.96           | 1    | 5      |
| Tax office respecting your privacy             | 3.77  | 1.09           | 1    | 5      |
| Legitimacy*                                    | 3.22  | 0.72           | 1    | 5      |
| Tax office trusted by you to administer fairly | 3.38  | 0.90           | 1    | 5      |
| Tax office meets obligations to Australians    | 3.21  | 0.87           | 1    | 5      |
| Tax office acted in interest of Australians    | 3.02  | 0.95           | 1    | 5      |
| Tax office does its job well                   | 3.29  | 0.85           | 1    | 5      |
| Tax evasion (non-compliance)                   | 2.08  | 0.71           | 1    | 4.50   |
| Age  | 50.78 | 13.88          | 18   | 86     |
| Paying tax is the right thing to do            | 4.08  | 0.47           | 1    | 5      |
| Whether previously audited or investigated     | 0.27  | 0.44           | 0    | 1      |
| Whether a previous assessment contested        | 0.31  | 0.46           | 0    | 1      |
| Whether information has been requested         | 0.47  | 0.50           | 0    | 1      |
| <i>Level-2 (wave) N = 511</i>                  |       |                |      |        |
| Female   | 0.50  | 0.50           | 0    | 1      |
| Foreign born                                   | 0.22  | 0.42           | 0    | 1      |

\* These are variables estimated using confirmatory factor analysis, factor loadings presented in Table 2.

\*\* Responses to these variables have been reverse coded.



et al., 2010), leading to systematic errors in the estimated construct if the assumptions are violated. Instead, we use confirmatory factor analysis, a standard latent variable estimation method that can discriminate across items, can be subject to measurement invariance tests, and is well suited to be used in the presence of ordinal items (such as those derived from Likert scale questions) tapping into an underlying continuous construct.

From the nineteen items available fourteen of them refer to specific contacts with the police. However, after the first contact with criminal justice authorities - which made subjects eligible for the study - most participants do not report additional contacts with the police across later survey waves, resulting in high levels of missing responses. Therefore, we focus our analysis on the remaining five items covering more general perceptions of procedural justice that were asked of all respondents at each survey wave. Of these, only four displayed measurement invariance over the seven waves of data, meaning they were consistently measuring the same underlying construct throughout the window of observation. This was determined by comparing model fit from nested models that, i) imposed the same factor structure at each time point, but freely estimated the factor loadings (configural invariance), and ii) constrained factor loadings to equality (metric invariance). No significant change in model fit was found when comparing the two nested models ( $p$ -value = 0.06,  $\chi^2 = 8.0$ , with 28 $df$ ), confirming that the factor structure and magnitude of factor loadings are the same at each time point. By contrast, the factor loadings for the fifth item varied substantially across waves.

Collectively, these four items refer to perceptions of equality of treatment shown by the police in their interactions with others: *'Police treat males and females differently'*, *'Police treat people differently depending how old they are'*, *'Police treat people differently depending on their race/ethnic group'*, and *'Police treat people differently depending on the neighborhoods they are from'*. These four items are also used in McLean et al. (2019) and Pina-Sánchez and Brunton-Smith (2020), as far as we are aware, the only studies based on the Pathways to Desistance where procedural justice is measured using latent variable estimation. Factor loadings are reported in Table 2. The obvious downside of this, more statistically principled approach, is that only one of the multiple dimensions composing the construct of procedural justice can be explored. One that to some extent overlaps with the concept of distributive justice. To expand the coverage of our analysis we also replicate our models using the fifth item of procedural justice that was asked to all respondents at each survey wave. Formulated as: *'Of the people you know who have had a contact with the police, how much of their story did the police let them tell?'*; this item taps the concept of voice in their interactions with the authorities (a core dimension of the concept of procedural justice).

For the analyses based on the Australian Tax Systems Surveys we used three questions on the perceived fairness and equity in the treatment displayed by the Australian Tax Office (ATO): *'(ATO) being accountable for what they do'*, *'(ATO) treating you fairly and reasonably'*, and *'(ATO) respecting your privacy'*. Each of these questions are measured on a five-point Likert scale from *'strongly disagree'* (1) to *'strongly agree'* (5). Metric invariance was confirmed for these three items across the three survey waves ( $p$ -value = 0.12,  $\chi^2 = 7.24$ , with 4 $df$ ). Expanding the measurement model to consider items tapping into the honesty or professionalism of the tax authority did not ensure satisfy metric invariance and were therefore discarded.

### 3.2 Legitimacy

In line with Tyler's work, the construct of legitimacy provided in the Pathways to Desistance seeks to capture confidence in an institution's professionalism, trust in its good intentions, and belief that its norms are entitled to be obeyed. Specifically, eleven items are available as a scale where

**Table 2** Factor loadings for each of the items used to measures procedural justice and legitimacy.

|  | Mean | SD   |
|--|------|------|
| <i>Dataset 1 - Pathways to Desistance</i>        |      |      |
| <i>Procedural Justice (treatment)</i>            |      |      |
| Police treat males and females differently       | 1.00 | 0.00 |
| Police treat differently depending on age        | 1.00 | 0.04 |
| Police treat differently depending on race       | 1.78 | 0.07 |
| Police treat differently by neighbourhoods       | 1.62 | 0.06 |
| <i>Legitimacy</i>                                |      |      |
| I have a great deal of respect for the police    | 1.00 | 0.00 |
| I feel proud of the police                       | 1.62 | 0.06 |
| People should support police                     | 1.28 | 0.04 |
| Police hold suspect until evidence to charge     | 0.38 | 0.01 |
| <i>Dataset 2 - Australian Tax Office</i>         |      |      |
| <i>Procedural Justice</i>                        |      |      |
| Tax office accountable for what they do          | 1.00 | 0.00 |
| Tax office treating you fairly and reasonably    | 1.32 | 0.10 |
| Tax office treating you as honest in tax affairs | 1.02 | 0.08 |
| Tax office offering professional service         | 0.72 | 0.05 |
| Tax office respecting your privacy               | 0.77 | 0.06 |
| <i>Legitimacy</i>                                |      |      |
| Tax office trusted by you to administer fairly   | 1.00 | 0.00 |
| Tax office meets obligations to Australians      | 1.11 | 0.09 |
| Tax office acted in interests of Australians     | 1.11 | 0.09 |
| Tax office does its job well                     | 0.79 | 0.07 |

they are aggregated using a simple mean. This raw scale is not used here because the eleven items conflate questions referring to beliefs of police and courts legitimacy. Instead, to maintain the focus on policing, only legitimacy items referring to police were used. One item - capturing honesty in treatment - was omitted because it did not correlate adequately with the rest (most likely because it represents procedural justice more than legitimacy). A second item referring to stop and search police practices was omitted because the factor loadings varied substantially over time. The four remaining items used to measure police legitimacy refer to the following statements: ‘*I have a great deal of respect for the police*’, ‘*I feel proud of the police*’, ‘*People should support police*’, and ‘*Police should hold suspect until they have evidence*’. For each item, response options range from ‘*strongly disagree*’ (1) to ‘*strongly agree*’ (5). In common with procedural justice, confirmatory factor analysis models were used to estimate the underlying construct, which displayed metric invariance across the seven survey waves (p-value = .08,  $\chi^2 = 26.8$ , with 18df).

For the analysis of the ‘Australian Tax Systems Surveys’ we use responses to the following statements: ‘*(ATO) trusted by you to administer tax system fairly*’, ‘*(ATO) meets obligations to Australians*’, ‘*(ATO) acted in interests of Australians*’, ‘*(ATO) does its job well*’. Response options range from ‘*strongly disagree*’ (1) to ‘*strongly agree*’ (5). Amongst the variables that were consistently formulated through the three waves of the study, none was found directly tapping into the perceived obligation to obey the tax authority. Despite this limitation in the coverage of our measurement model, measurement invariance tests (p-value = .052,  $\chi^2 = 5.1$ , with 6df) suggest the four items available are part of a single underlying latent construct, measured stably across the three waves of the study.

### 3.3 Compliance

Compliance is arguably the most encompassing and loosely defined of the three constructs forming the procedural justice model (Walters and Bolger, 2019). Prior studies have included a variety of measures of delinquent behaviour, as well as more general law-abiding behaviour and attitudes such as cooperation with an authority and obedience to its norms. From the Pathways data we use self-reported frequency of offending, a measure that has been commonly used in previous studies on the subject (Augustyn, 2015; Kaiser and Reisig, 2017; Penner et al., 2014). This is the sum of i) the number of criminal acts that the respondent reports to have committed ‘*in the last year*’ from the baseline interview, and ii) any additional acts ‘*since the last interview*’ in follow up surveys. To reduce recall error participants are asked to consider 22 different illegal activities, covering violent, sex, property and other forms of crime. The summary variable is log-transformed to approximate a normal distribution.

For the Tax data we focus on attitudes towards tax avoidance and tax evasion.<sup>5</sup> Here we take the mean of responses to the following two statements: ‘*Effort-to legally pay little tax*’ and ‘*Acceptable to overstate tax deductions*’, with response options ranging from ‘*strongly disagree*’ (1) to ‘*strongly agree*’ (5).

### 3.4 Potential Moderators

In selecting the set of potential procedural justice moderators we sought to include those that have been previously found significant in the literature. However, given the different samples and authorities studied in the two datasets, and the limitations in the variables captured in each of them, the list of potential moderators considered in our analysis is not comprehensive.

Belonging to a minority represents the factor most commonly tested and theorised as a potential moderator, although its effect remains unclear. In our analysis this is examined by considering the participants’ ethnic group and whether they were born in a foreign country. However, ethnicity is only recorded in the Pathways data, which distinguishes between white, black, Hispanic, and other. Additional demographic factors considered are age and gender. The former is particularly relevant to analyses of the Pathways data, where it has been detected as a significant moderator in the past (Augustyn, 2015; Fagan and Piquero, 2007).

Two other factors particularly relevant for the examination of the invariance thesis, at least in the context of the police are community support (Antrobus et al., 2015) and previous victimisation (Wolfe et al., 2016). The former is measured as the number of family and non-family domains where supportive adults are present. Eight different domains are listed in the questionnaire (e.g. ‘*Adults you admire and want to be like*’); the variable used here captures the average number of domains identified by each participant across the study’s window of observation. Previous victimisation is approximated using exposure to violence, which reflects up to six violence related items to which the subject was a victim (e.g. ‘*Have you ever been chased where you thought you might be seriously hurt?*’). As with community support, the average number of items identified throughout the study is used in our analysis.

An additional set of variables are considered to explore whether the frequency of interactions with the authority could have a moderating effect. From the Pathways data we use whether the subject reports having been picked up and accused by the police (Kaiser and Reisig, 2017; Walters,

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<sup>5</sup> For consistency sake we aimed to use other measures tapping more clearly on offending, however those available in the dataset (such as whether the respondent has ever been fined by the tax authority) show low frequencies, and as such do not discriminate adequately amongst respondents.

2018), responses are summed across the six waves considered following the first interview, hence values range from zero to six. For the analysis of the Tax data we can also focus on the nature of the interactions with the tax authority. Three variables are included to capture whether: the interviewee has been audited or investigated; a previous assessment from the tax authority has been contested; and information has been requested to the tax authority.

One last important moderator considered is law legitimacy (Murphy et al., 2009). This construct is approximated using responses to a different Likert scale question in each dataset. In the analysis of the Pathways data we use responses to the statement ‘*Laws are meant to be broken*’ ranging from ‘*strongly disagree*’ (1) to ‘*strongly agree*’ (4). For the Tax data we use responses to ‘*Paying tax is right thing to do*’, ranging from ‘*strongly disagree*’ (1) to ‘*strongly agree*’ (5). As before, the average subject responses throughout the windows of observation are used in our models. For the analysis all non-binary moderators are demeaned to facilitate interpretation.

### 3.5 Modelling Strategy

As described in Sections 3.1 - 3.2, and reported in Table 2, legitimacy and the equality of *treatment* dimension of procedural justice are taken as latent variables, estimated using confirmatory factor analysis models. Models including *voice* as a measure of procedural justice introduce the variable after it has been standardised. This is done to facilitate comparisons across models. To regress legitimacy on procedural justice mixed effects structural equation models are used. The mixed effects specification allows us to exploit the repeated subject measurements recorded in the two longitudinal datasets. This is done by differentiating within and between person effects, described graphically for the procedural justice with legitimacy relationship in Figure 1.

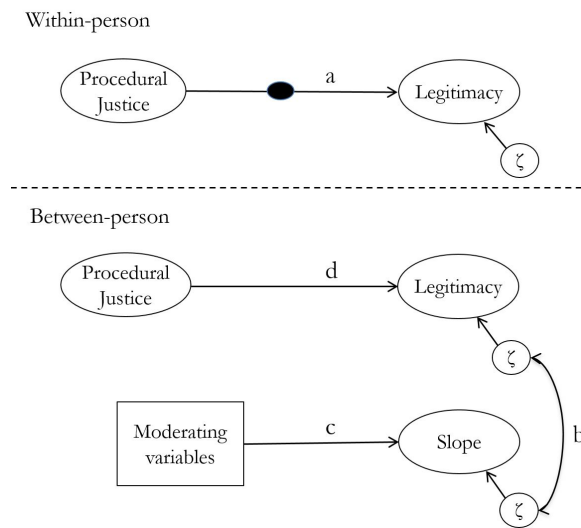
The within-person effect, represented by pathway-a, captures the association of the mean change in legitimacy and procedural justice ratings experienced by each participant across the series of measurement occasions. The between-person effect (pathway-d) identifies the extent to which participants with higher mean ratings of procedural justice across measurement occasions, also tend to have higher mean legitimacy ratings during that same window of observation, net of any within-person variability. This is made possible by allowing the intercepts for each of the indicators used to estimate procedural justice and legitimacy in the within-person model to vary between respondents (see Muthén and Muthén, 2012, p. 274), with these varying intercepts treated as the indicators of between-person latent variables for procedural justice and legitimacy (indicator pathways omitted from Figure 1 for clarity). In addition to letting us differentiate within from between person effects, this approach effectively controls for the time-constant unobserved heterogeneity (Bell and Jones, 2015; Hamaker and Muthén, 2019), like traditional fixed effects models (Wooldridge, 2002).

In a second stage, the random intercept specification is expanded by allowing the within-person effect of procedural justice on legitimacy to vary randomly across respondents. This is represented by the filled circle on pathway-a. At the between level this random slope term is itself modelled as a latent variable (labelled slope), which is correlated with the residual variance of legitimacy, pathway-b (see Muthén and Muthén, 2012, p. 278). By estimating the extent to which the within-person procedural justice effect varies between subjects, as opposed to simply comparing the mean effect across groups, this model provides a more comprehensive assessment of the invariance thesis. If the procedural justice effect is invariant, then we should expect uniform positive within-person effects across all participants, represented by a negligible random slope (Hamaker, 2012). If, however, the within-person procedural justice effect varies substantially across participants, this will be represented by a significant random slope.

In a final stage the random slope latent variable is regressed on the set of theoretically relevant explanatory variables listed in Section 3.4 (pathway-c). Modelling the slope latent variable in this way makes it straightforward to further explore how the mean within-person relationship between procedural justice and legitimacy (the intercept of the latent variable) differs across values of the included predictor variables (pathway-c), with the regression coefficients functioning like cross-level interaction terms in a traditional mixed-effects model. Assuming a positive relationship between procedural justice and legitimacy on average, then a positive term for pathway-c would indicate that the relationship between procedural justice and legitimacy is stronger for that predictor variable. By contrast, a negative term would indicate a weaker (or even negative) relationship. As such, the inclusion of potential moderators as explanatory variables of the random slope allows us to move beyond a mere test of the invariance hypothesis, providing an initial exploration of the potential reasons why the within-person relationship varies between people.

In sum, our approach enables an examination of both known and unknown sources of variation in the within-person relationship between procedural justice and legitimacy.

These three random models are replicated for the two datasets - and two measures of procedural justice - considered, taking legitimacy but also compliance as outcome variables. Models on compliance also include legitimacy as a regressor, alongside procedural justice. In a final stage, we also explore the potential moderating effect of the set of variables listed in Section 3.4. This is done by including these variables as regressors of the latent variable ‘slope’ in the between-person part of the model, represented as pathway-c in Figure 1 (see Muthén and Muthén, 2012, p. 285).



**Fig. 1** Random slope model examining the within and between-person effect of procedural justice on legitimacy.

All models are estimated in Mplus using Bayesian estimation with diffuse priors assigned to all parameters. Two MCMC chains are estimated with a burn-in of 10,000 iterations and a monitoring length of 10,000. Convergence was confirmed by a proportional scale reduction factor that was close to one (Asparouhov, 2010). Increasing the burn-in and monitoring length to 25,000 led to no discernible difference in parameter estimates or scale reduction factor.

## 4 Results

Model results exploring the relationship between procedural justice and legitimacy are reported in Table 3, which includes the posterior means, standard deviations (SDs) and 95% credible intervals (CIs) of the 20,000 pooled monitoring iterations. These are analogous to the parameter estimates, standard errors and confidence intervals reported in frequentist analysis. Similarly, those estimates where the 95% credible interval does not overlap zero (reported in bold) can be considered statistically significant.

### 4.1 Procedural Justice Association with Legitimacy

Looking first at the simpler random intercept models, we find evidence of a positive and strong association between procedural justice and legitimacy, both at the within and between-person level, across the two datasets and measures of procedural justice. The strength of that relationship is particularly marked at the between-level, which suggests that the positive relationship is mostly stable, but reinforced significantly across time. Put differently, subjects who on average, across the window of observations, report high perceptions of procedural justice, also report high perceptions of legitimacy during that period, and vice versa. At the same time, when subjects report higher perceptions of procedural justice at a given time point than they do on average across the window of observation, these are also associated with higher perceptions of legitimacy than on average at that given time point. These results are similar in the two datasets, despite the differences in the measurement of procedural justice, sample composition, window of observation, and authority examined.

Some differences can be observed in the random part of the models. The intra-cluster correlation (understood as the proportion of legitimacy’s unexplained variance stemming from the between-person level) is 0.56 to 0.58 in the Pathways data and 0.22 in the Tax data. This indicates that at least half of the unexplained variability in legitimacy ratings in the Pathways data stems from trait-like, stable, between-person differences, whereas this does not reach a quarter of the overall unexplained variability in the Tax data. The share of between-person unexplained variability in legitimacy beliefs is nonetheless substantial in the two studies, which justifies further exploration through the specification of random slope terms.

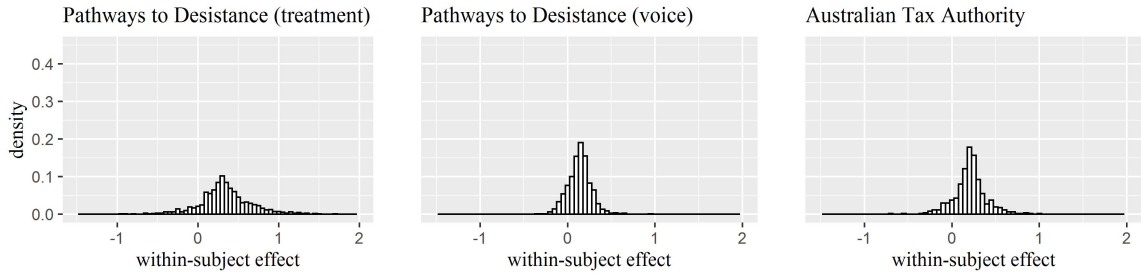
As shown in the results for the stage-2 models, the random slope terms are found to be significant and substantial in both datasets, across different measures of procedural justice. The average within-person relationship between procedural justice and legitimacy is estimated as 0.34 and 0.14 in the Pathways study, and 0.21 in the Tax study, with associated random slope variances of 0.41 and 0.11 in the former, and 0.17 in the latter. This indicates a high degree of between-person variability, especially in the Pathways study when procedural justice is measured as equality of treatment. To put this variability in context, in Figure 2 we have plotted the distribution of the estimated within-person effects for each of the participants in the two studies. These histograms demonstrate that the positive within-person procedural justice association with legitimacy is not uniform across participants. In fact, for at least 13.1% of the participants in the Pathways data (regardless of the measure of procedural justice used), and 11.7% in the Tax data, the within-person relationship is more than twice as strong as the sample average. By contrast the relationship is negative for more than 10.8% (14.3% when procedural justice is measured by *voice* rather than equality of *treatment*) and 11.3% of participants across the two studies.

So what, then, helps explain the contingent nature of the connection between people’s assessments of procedural justice and legitimacy? The correlation between the random slope and random

**Table 3** Mixed effects structural equation models examining the between-person variability in the procedural justice association with legitimacy.\*

|   | Stage-1                |      |              | Stage-2            |      |               | Stage-3                                 |      |                |
|---|------------------------|------|--------------|--------------------|------|---------------|---|------|----------------|
|   | Random intercept model |      |              | Random slope model |      |               | Random slope model including moderators |      |                |
|   | Mean                   | SD   | 95% CI       | Mean               | SD   | 95% CI        | Mean                                    | SD   | 95% CI         |
| <i>Dataset 1 - Pathways to Desistance (treatment)</i> |                        |      |              |                    |      |               |   |      |                |
| <i>Fixed Effects</i>                                  |                        |      |              |                    |      |               |   |      |                |
| Proc. justice (within)                                | <b>0.33</b>            | 0.03 | (0.28, 0.39) | <b>0.34</b>        | 0.04 | (0.27, 0.42)  | <b>0.47</b>                             | 0.08 | (0.32, 0.63)   |
| Proc. justice (between)                               | <b>0.85</b>            | 0.08 | (0.70, 1.00) | <b>0.83</b>        | 0.07 | (0.69, 0.97)  | <b>0.83</b>                             | 0.08 | (0.69, 0.99)   |
| <i>Random Effects</i>                                 |                        |      |              |                    |      |               |   |      |                |
| Var. leg. (within)                                    | <b>0.97</b>            | 0.04 | (0.88, 1.05) | <b>0.79</b>        | 0.04 | (0.70, 0.86)  | <b>0.80</b>                             | 0.05 | (0.72, 0.90)   |
| Var. leg. (between)                                   | <b>1.34</b>            | 0.08 | (1.19, 1.52) | <b>1.29</b>        | 0.08 | (1.14, 1.46)  | <b>1.33</b>                             | 0.09 | (1.17, 1.51)   |
| Var. slope proc. just.                                |                        |      |              | <b>0.41</b>        | 0.07 | (0.30, 0.56)  | <b>0.41</b>                             | 0.07 | (0.29, 0.57)   |
| Cor. slope-intercept                                  |                        |      |              | 0.09               | 0.06 | (-0.03, 0.21) | 0.11                                    | 0.07 | (-0.03, 0.26)  |
| Intra-cluster cor.                                    | <b>0.58</b>            | 0.01 | (0.55, 0.61) |                    |      |               |   |      |                |
| <i>Moderating Effects</i>                             |                        |      |              |                    |      |               |   |      |                |
| Female  |                        |      |              |                    |      |               | -0.14                                   | 0.10 | (-0.34, 0.06)  |
| Age   |                        |      |              |                    |      |               | 0.05                                    | 0.03 | (-0.01, 0.11)  |
| Black (ref: white)                                    |                        |      |              |                    |      |               | -0.08                                   | 0.09 | (-0.26, 0.11)  |
| Hispanic (ref: white)                                 |                        |      |              |                    |      |               | <b>-0.19</b>                            | 0.09 | (-0.37, -0.00) |
| Other ethn. (ref: white)                              |                        |      |              |                    |      |               | -0.06                                   | 0.18 | (-0.42, 0.27)  |
| Foreign born  |                        |      |              |                    |      |               | -0.24                                   | 0.14 | (-0.51, 0.04)  |
| Exposure to violence                                  |                        |      |              |                    |      |               | 0.00                                    | 0.10 | (-0.19, 0.18)  |
| Community support                                     |                        |      |              |                    |      |               | -0.02                                   | 0.03 | (-0.08, 0.04)  |
| Laws meant to be broken                               |                        |      |              |                    |      |               | 0.00                                    | 0.05 | (-0.09, 0.10)  |
| Picked by the police                                  |                        |      |              |                    |      |               | 0.02                                    | 0.03 | (-0.04, 0.08)  |
| <i>Dataset 1 - Pathways to Desistance (voice)</i>     |                        |      |              |                    |      |               |   |      |                |
| <i>Fixed Effects</i>                                  |                        |      |              |                    |      |               |   |      |                |
| Proc. justice (within)                                | <b>0.14</b>            | 0.02 | (0.01, 0.18) | <b>0.14</b>        | 0.02 | (0.10, 0.18)  | <b>0.21</b>                             | 0.05 | (0.11, 0.31)   |
| Proc. justice (between)                               | <b>1.18</b>            | 0.11 | (0.96, 1.41) | <b>1.22</b>        | 0.11 | (1.00, 1.45)  | <b>1.22</b>                             | 0.12 | (1.00, 1.45)   |
| <i>Random Effects</i>                                 |                        |      |              |                    |      |               |   |      |                |
| Var. leg. (within)                                    | <b>0.99</b>            | 0.05 | (0.90, 1.09) | <b>0.92</b>        | 0.05 | (0.84, 1.01)  | <b>0.92</b>                             | 0.05 | (0.83, 1.02)   |
| Var. leg. (between)                                   | <b>1.28</b>            | 0.09 | (1.12, 1.47) | <b>1.27</b>        | 0.09 | (1.11, 1.45)  | <b>1.28</b>                             | 0.09 | (1.11, 1.46)   |
| Var. slope proc. just.                                |                        |      |              | <b>0.11</b>        | 0.02 | (0.07, 0.16)  | <b>0.11</b>                             | 0.02 | (0.07, 0.16)   |
| Cor. slope-intercept                                  |                        |      |              | <b>0.20</b>        | 0.09 | (0.03, 0.37)  | 0.18                                    | 0.09 | (-0.01, 0.36)  |
| Intra-cluster cor.                                    | <b>0.56</b>            | 0.01 | (0.53, 0.59) |                    |      |               |   |      |                |
| <i>Moderating Effects</i>                             |                        |      |              |                    |      |               |   |      |                |
| Female  |                        |      |              |                    |      |               | -0.11                                   | 0.07 | (-0.24, 0.02)  |
| Age   |                        |      |              |                    |      |               | 0.00                                    | 0.02 | (-0.03, 0.04)  |
| Black (ref: white)                                    |                        |      |              |                    |      |               | -0.04                                   | 0.06 | (-0.16, 0.08)  |
| Hispanic (ref: white)                                 |                        |      |              |                    |      |               | -0.10                                   | 0.07 | (-0.22, 0.03)  |
| Other ethn. (ref: white)                              |                        |      |              |                    |      |               | -0.18                                   | 0.11 | (-0.40, 0.03)  |
| Foreign born  |                        |      |              |                    |      |               | 0.02                                    | 0.10 | (-0.17, 0.20)  |
| Exposure to violence                                  |                        |      |              |                    |      |               | 0.10                                    | 0.06 | (-0.02, 0.21)  |
| Community support                                     |                        |      |              |                    |      |               | <b>0.04</b>                             | 0.02 | (0.00, 0.07)   |
| Laws meant to be broken                               |                        |      |              |                    |      |               | -0.02                                   | 0.03 | (-0.08, 0.04)  |
| Picked by the police                                  |                        |      |              |                    |      |               | 0.02                                    | 0.02 | (-0.01, 0.05)  |
| <i>Dataset 2 - Australian Tax Authority</i>           |                        |      |              |                    |      |               |   |      |                |
| <i>Fixed Effects</i>                                  |                        |      |              |                    |      |               |   |      |                |
| Proc. justice (within)                                | <b>0.20</b>            | 0.04 | (0.13, 0.27) | <b>0.21</b>        | 0.04 | (0.13, 0.31)  | <b>0.28</b>                             | 0.09 | (0.13, 0.46)   |
| Proc. justice (between)                               | <b>0.67</b>            | 0.07 | (0.56, 0.82) | <b>0.68</b>        | 0.07 | (0.57, 0.82)  | <b>0.70</b>                             | 0.07 | (0.58, 0.85)   |
| <i>Random Effects</i>                                 |                        |      |              |                    |      |               |   |      |                |
| Var. leg. (within)                                    | <b>0.69</b>            | 0.08 | (0.55, 0.87) | <b>0.46</b>        | 0.08 | (0.32, 0.64)  | <b>0.47</b>                             | 0.09 | (0.31, 0.67)   |
| Var. leg. (between)                                   | <b>0.20</b>            | 0.07 | (0.05, 0.33) | <b>0.22</b>        | 0.06 | (0.12, 0.35)  | <b>0.22</b>                             | 0.06 | (0.12, 0.36)   |
| Var. slope proc. just.                                |                        |      |              | <b>0.17</b>        | 0.05 | (0.09, 0.30)  | <b>0.18</b>                             | 0.06 | (0.10, 0.33)   |
| Cor. slope-intercept                                  |                        |      |              | 0.17               | 0.16 | (-0.17, 0.48) | 0.22                                    | 0.17 | (-0.13, 0.52)  |
| Intra-cluster cor.                                    | <b>0.22</b>            | 0.07 | (0.06, 0.33) |                    |      |               |   |      |                |
| <i>Moderating Effects</i>                             |                        |      |              |                    |      |               |   |      |                |
| Female  |                        |      |              |                    |      |               | -0.09                                   | 0.08 | (-0.26, 0.07)  |
| Age   |                        |      |              |                    |      |               | -0.00                                   | 0.00 | (-0.01, 0.00)  |
| Foreign born  |                        |      |              |                    |      |               | 0.03                                    | 0.10 | (-0.17, 0.23)  |
| Paying tax is right                                   |                        |      |              |                    |      |               | -0.14                                   | 0.10 | (-0.33, 0.05)  |
| Previously audited                                    |                        |      |              |                    |      |               | 0.02                                    | 0.10 | (-0.18, 0.21)  |
| Assessment contested                                  |                        |      |              |                    |      |               | -0.08                                   | 0.09 | (-0.26, 0.10)  |
| Information requested                                 |                        |      |              |                    |      |               | -0.03                                   | 0.08 | (-0.19, 0.14)  |

\* Estimates which 95% CIs do not overlap zero highlighted in bold.



**Fig. 2** Variability of the within-person procedural justice association with legitimacy across subjects.

intercept terms reported in stage-2 models allows to take a first step in exploring this question. These correlations are not significant for the Tax or the Pathways data when based on *treatment*. However, for the study using *voice* a significant 0.20 correlation is estimated. This means that the within-person relationship between procedural justice and legitimacy is even stronger for participants reporting higher than average mean rating of legitimacy. In other words, the within-person association between procedural justice and legitimacy is stronger amongst adolescents that report higher perceptions of police legitimacy, and weaker - potentially negative - amongst those reporting lower police legitimacy.

Stage-3 models regress the random slope of the within-person effect of procedural justice on the set of explanatory variables identified in Section 3.4. Here the mean within-person effects (0.47, 0.21 and 0.28) refer to the effect of procedural justice on legitimacy when all explanatory variables are held at zero (for example, in the Pathways data, this is a foreign born white male, of average age, average exposure to violence, community support, perceptions of law legitimacy and contact with the police). From all the explanatory variables considered, only two are significant, *Hispanic* (-0.19) and *community support* (0.04). The former means that the within-person positive association between procedural justice (measured as *treatment*) and legitimacy is estimated to be roughly 40% less strong for Hispanics than for white participants, although - on average - the association remains positive. The latter points at the within-person association between procedural justice (measured as *voice*) and legitimacy being roughly 20% stronger for every additional domain where adolescents reports to have a supportive adult. No potential moderating factors are found significant for the Tax study.

#### 4.2 Procedural Justice Association with Compliance

Results for the models exploring the variability in the relationship between procedural justice and compliance are reported in Table 4. For the Pathways data, we find the expected negative and significant within and between procedural justice associations with offending, but this is only the case when *treatment* is used. When *voice* is used as a measure of procedural justice, neither the between nor the within person associations with compliance are significant. Interestingly, the intra-cluster correlation is now much lower (approximately 0.25) and consistent across measures of procedural justice, indicating that most of the unexplained variability in offending stems from differences experienced within subjects throughout the window of observation. For the Tax data only the between-person effect is significant, indicating that the relationship between procedural justice and tax avoidance disposition is remarkably stable across the window of observation. The procedural justice effect on compliance is in this case entirely attributable to trait-like person characteristics that do not change throughout the window of observation. Still, we cannot yet discard the within-person procedural

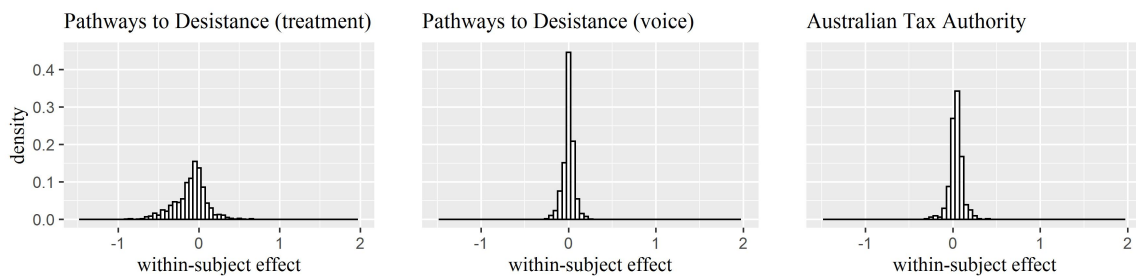


justice effect as meaningless. Roughly, a third of the unexplained variability in tax avoidance stems from the between-person level, therefore, it could be the case that the mean within-person effect is not significantly different from zero, but highly variable across subjects.

As shown in the Stage-2 models, the random slope terms are less substantial than was noted for the relationship with legitimacy. This more modest between-person variability in the within-person effect is particularly noted for the Tax data and for the Pathways study when *voice* is used. In these two instances most within-person associations are close to zero (see Figure 3). In the Pathways study using *treatment* we observe substantial between-person variability, but less so than what was detected previously for the relationship between procedural justice and legitimacy. Here, for 23.6% of subjects, the estimated within-person procedural justice association with offending is more than twice as strong than we observe in the fixed part of the model (-0.11), whereas for 27.6% the association is estimated to be positive, but the distribution is more highly concentrated around zero than before.

The correlation between the random intercept and random slope terms in the Pathways data using *treatment* (-0.28) is also significant. The negative sign indicates that the within-person procedural justice association with offending is stronger for subjects reporting a higher average frequency of offending and weaker for those reporting lower than average offending. That is, the a priori effectiveness of procedural justice to reduce offending is clearer for the more prolific offenders.

Since the random slope terms for the Tax data and the Pathways study based on *voice* are negligible, the exploration of moderating factors that could be explaining the observed between person variability is restricted to the Pathways study using *treatment*. As shown in the results for the Stage-3 model, none of the factors considered were found significant.



**Fig. 3** Variability of the within-person procedural justice association with compliance across subjects

## 5 Discussion

We have used longitudinal data and mixed effects structural equation models to provide a new examination of the procedural justice invariance thesis (Wolfe et al., 2016); i.e. the view of procedural justice as a uniform model, regardless of demographic characteristics, personal experiences, or situational differences. We have focussed on the change in compliance and legitimacy associated with changes in perceptions of procedural justice across time, and estimate the overall between-person variability around those associations.

To enhance the external validity of our study we employed two datasets. One captures perceptions of police procedural justice amongst young offenders in the US, and operationalises compliance as frequency of offending, the other looks at Australian citizens' perceptions of their tax office,

**Table 4** Mixed effects structural equation models examining the between-person variability in the procedural justice association with compliance (measured as frequency of offending in the Pathways data and tax avoidance disposition in the Tax data).\*

|   | Stage-1                |      |                | Stage-2            |      |                | Stage-3                                 |      |                |
|---|------------------------|------|----------------|--------------------|------|----------------|---|------|----------------|
|   | Random intercept model |      |                | Random slope model |      |                | Random slope model including moderators |      |                |
|   | Mean                   | SD   | 95% CI         | Mean               | SD   | 95% CI         | Mean                                    | SD   | 95% CI         |
| <i>Dataset 1 - Pathways to Desistance (treatment)</i> |                        |      |                |                    |      |                |   |      |                |
| <i>Fixed Effects</i>                                  |                        |      |                |                    |      |                |   |      |                |
| Proc. justice (within)                                | <b>-0.06</b>           | 0.02 | (-0.10, -0.03) | <b>-0.11</b>       | 0.03 | (-1.58, -0.05) | -0.10                                   | 0.05 | (-0.21, 0.00)  |
| Proc. justice (between)                               | <b>-0.10</b>           | 0.04 | (-0.17, -0.03) | <b>-0.08</b>       | 0.04 | (-0.16, -0.01) | <b>-0.08</b>                            | 0.04 | (-0.15, -0.01) |
| Legitimacy (within)                                   | <b>-0.13</b>           | 0.01 | (-0.16, -0.11) | <b>-0.13</b>       | 0.01 | (-0.16, -0.11) | <b>-0.13</b>                            | 0.01 | (-0.16, -0.11) |
| Legitimacy (between)                                  | <b>-0.15</b>           | 0.02 | (-0.19, -0.12) | <b>-0.16</b>       | 0.02 | (-0.19, -0.13) | <b>-0.16</b>                            | 0.02 | (-0.19, -0.13) |
| <i>Random Effects</i>                                 |                        |      |                |                    |      |                |   |      |                |
| Var. compli. (within)                                 | <b>0.70</b>            | 0.01 | (0.67, 0.72)   | <b>0.63</b>        | 0.02 | (0.60, 0.67)   | <b>0.63</b>                             | 0.02 | (0.60, 0.66)   |
| Var. compli. (between)                                | <b>0.24</b>            | 0.01 | (0.21, 0.26)   | <b>0.23</b>        | 0.01 | (0.21, 0.26)   | <b>0.23</b>                             | 0.01 | (0.21, 0.26)   |
| Var. slope proc. just.                                |                        |      |                | <b>0.16</b>        | 0.04 | (0.08, 0.25)   | <b>0.17</b>                             | 0.04 | (0.10, 0.25)   |
| Cor. slope-intercept                                  |                        |      |                | <b>-0.28</b>       | 0.09 | (-0.47, -0.11) | -0.22                                   | 0.11 | (-0.43, 0.01)  |
| Intra-cluster cor.                                    | <b>0.25</b>            | 0.01 | (0.23, 0.28)   |                    |      |                |   |      |                |
| <i>Moderating Effects</i>                             |                        |      |                |                    |      |                |   |      |                |
| Female  |                        |      |                |                    |      |                | 0.02                                    | 0.06 | (-0.10, 0.15)  |
| Age   |                        |      |                |                    |      |                | -0.03                                   | 0.02 | (-0.07, 0.01)  |
| Black (ref: white)                                    |                        |      |                |                    |      |                | -0.03                                   | 0.07 | (-0.16, 0.10)  |
| Hispanic (ref: white)                                 |                        |      |                |                    |      |                | -0.01                                   | 0.07 | (-0.14, 0.12)  |
| Other ethn. (ref: white)                              |                        |      |                |                    |      |                | 0.14                                    | 0.12 | (-0.08, 0.38)  |
| Foreign born  |                        |      |                |                    |      |                | -0.05                                   | 0.10 | (-0.25, 0.13)  |
| Exposure to violence                                  |                        |      |                |                    |      |                | -0.11                                   | 0.08 | (-0.27, 0.04)  |
| Community support                                     |                        |      |                |                    |      |                | -0.03                                   | 0.02 | (-0.07, 0.01)  |
| Laws meant to be broken                               |                        |      |                |                    |      |                | 0.04                                    | 0.03 | (-0.02, 0.11)  |
| Picked by the police                                  |                        |      |                |                    |      |                | 0.01                                    | 0.02 | (-0.03, 0.05)  |
| <i>Dataset 1 - Pathways to Desistance (voice)</i>     |                        |      |                |                    |      |                |   |      |                |
| <i>Fixed Effects</i>                                  |                        |      |                |                    |      |                |   |      |                |
| Proc. justice (within)                                | 0.01                   | 0.01 | (-0.02, 0.03)  | 0.01               | 0.02 | (-0.02, 0.05)  |   |      |                |
| Proc. justice (between)                               | 0.01                   | 0.05 | (-0.01, 0.01)  | 0.02               | 0.05 | (-0.08, 0.12)  |   |      |                |
| Legitimacy (within)                                   | <b>-0.14</b>           | 0.01 | (-0.17, -0.12) | <b>-0.14</b>       | 0.01 | (-0.17, -0.12) |   |      |                |
| Legitimacy (between)                                  | <b>-0.17</b>           | 0.01 | (-0.20, -0.14) | <b>-0.18</b>       | 0.02 | (-0.21, -0.14) |   |      |                |
| <i>Random Effects</i>                                 |                        |      |                |                    |      |                |   |      |                |
| Var. compli. (within)                                 | <b>0.70</b>            | 0.01 | (0.67, 0.72)   | <b>0.67</b>        | 0.01 | (0.64, 0.69)   |   |      |                |
| Var. compli. (between)                                | <b>0.24</b>            | 0.01 | (0.21, 0.27)   | <b>0.24</b>        | 0.01 | (0.22, 0.27)   |   |      |                |
| Var. slope proc. just.                                |                        |      |                | <b>0.04</b>        | 0.01 | (0.02, 0.06)   |   |      |                |
| Cor. slope-intercept                                  |                        |      |                | -0.11              | 0.10 | (-0.32, 0.07)  |   |      |                |
| Intra-cluster cor.                                    | <b>0.26</b>            | 0.01 | (0.23, 0.28)   |                    |      |                |   |      |                |
| <i>Dataset 2 - Australian Tax Authority</i>           |                        |      |                |                    |      |                |   |      |                |
| <i>Fixed Effects</i>                                  |                        |      |                |                    |      |                |   |      |                |
| Proc. justice (within)                                | 0.05                   | 0.03 | (-0.01, 0.10)  | 0.04               | 0.03 | (-0.03, 0.10)  |   |      |                |
| Proc. justice (between)                               | <b>-0.56</b>           | 0.17 | (-0.99, -0.28) | <b>-0.55</b>       | 0.17 | (-0.97, -0.29) |   |      |                |
| Legitimacy (within)                                   | <b>-0.15</b>           | 0.04 | (-0.23, -0.07) | <b>-0.15</b>       | 0.04 | (-0.23, -0.07) |   |      |                |
| Legitimacy (between)                                  | <b>0.62</b>            | 0.22 | (0.27, 1.14)   | <b>0.61</b>        | 0.23 | (0.27, 1.16)   |   |      |                |
| <i>Random Effects</i>                                 |                        |      |                |                    |      |                |   |      |                |
| Var. compli. (within)                                 | <b>0.60</b>            | 0.03 | (0.55, 0.65)   | <b>0.53</b>        | 0.04 | (0.46, 0.61)   |   |      |                |
| Var. compli. (between)                                | <b>0.28</b>            | 0.06 | (0.15, 0.38)   | <b>0.29</b>        | 0.06 | (0.15, 0.39)   |   |      |                |
| Var. slope proc. just.                                |                        |      |                | <b>0.04</b>        | 0.03 | (0.01, 0.11)   |   |      |                |
| Cor. slope-intercept                                  |                        |      |                | -0.13              | 0.21 | (-0.51, 0.35)  |   |      |                |
| Intra-cluster cor.                                    | <b>0.32</b>            | 0.05 | (0.20, 0.40)   |                    |      |                |   |      |                |

\* Estimates which 95% CIs do not overlap zero highlighted in bold.

and measures compliance as tax avoidance disposition. Further, to overcome different measurement problems detected in the former dataset, the analysis was replicated using two proxies of procedural justice, one tapping on perceptions of equality of treatment and another on the concept of voice.

In most of our models we find the expected positive between-person relationships for procedural justice with legitimacy and compliance, which tend to be stronger than the estimated within-person associations, pointing at the effect attributed to procedural justice being predominantly stable across time. This is particularly the case for Australian perceptions of the tax authority, where the within-person association between procedural justice and compliance was not significant, suggesting a time-invariant relationship. Still, the within-person associations between procedural justice and legitimacy across the two datasets, and with compliance for the American data based on young offenders and perceptions of equality of treatment, are statistically and substantially significant. This indicates that the procedural justice model is not completely static, and representing it as such, i.e. ignoring differences at the between and within-person level, could lead to ecological bias (Hoffman and Stawski, 2009; Hamaker, 2012).

In relation to our main research question, we observed substantial variability across subjects in most of the within-person effects considered. This was shown by significant random slopes in the two datasets, which appeared especially meaningful for the procedural justice association with legitimacy, for the sample of young offenders, and for measurements of procedural justice based on perceptions of equality of treatment. In that case, in spite of the strong within-person procedural justice association with legitimacy, about 13.1% of young offenders showed an effect more than twice as strong than the average subject in that sample, and for 10.8% the association appeared negative. These findings question the invariance thesis. When we focus on how changes in perceptions of procedural justice are associated with legitimacy and compliance across time, the between-person variability is so marked that these relationships are not just marginally stronger or weaker for some individuals, but a relationship of a completely different nature for many of them.

### 5.1 Methodological and Theoretical Considerations

Two main approaches have been used to explore the invariance thesis in the literature. One based on the specification of interaction terms thought to moderate the effect of procedural justice on legitimacy and compliance (Murphy, 2017; Wolfe et al., 2016; Zahnw et al., 2019). The other involves specifying separate models for different groups of the population (Baker and Gau, 2018; Reisig et al., 2020; Sunshine and Tyler, 2003). Both of these approaches are affected by important limitations, most notably, they can only provide a partial assessment of the extent to which the effect of procedural justice varies across subjects, an assessment restricted to just recorded personal characteristics.

By focusing on the between-person variability of the effects associated to changes in perceptions of procedural justice across time we have been able to provide an alternative, life-course-centred, test of the invariance thesis, one that is not limited to the choice of potential moderating factors to be explored. This distinct analytical focus, however, prevents us from making direct comparisons with previous results from the literature. All previous examinations of the invariance thesis have relied on cross-sectional data, and as such, regardless of the modelling approach used, refer to a static characterisation of the procedural justice model (Kaiser and Reisig, 2017). Consequently, even though we find substantial between person variability in four of the six procedural justice associations with legitimacy and compliance, our findings cannot be used to directly refute or corroborate previous research on the subject. Rather, we point at important gaps so far unacknowledged in previous examinations of the invariance thesis. Specifically, the need to examine the variability of the

procedural justice model across time, and beyond a limited set of - a priori - theoretically relevant moderating factors

We also show how the mixed effects approach used here can be extended to explore the potential moderating effect of time-invariant factors, enabling an exploration of the causes of any identified disparities. Importantly, multiple potential moderating factors were assessed simultaneously without the need to divide the sample or specify interaction terms. Out of the eight factors explored in the sample of young offenders (repeated for two different measures of procedural justice), and seven factors explored in the Tax sample, we only found two showing a significant moderating effect. Namely, the within-person association between procedural justice (based on perceptions of equality of treatment) and legitimacy is weaker for Hispanic young offenders, while the same association when procedural justice is measured using voice considerations, is stronger amongst adolescents that identify more supportive adults in different domains of their lives. Such relatively poor predictive performance in spite of the substantial between-person variability detected, further highlights the limitations of previous approaches adopted in the literature, and the need to assess the overall between-person variability around specific procedural justice effects. In short, our findings demonstrate that the absence of significant moderating effects is a necessary but not sufficient condition to corroborate the invariance thesis.

In relation to the specific weaker procedural justice association with legitimacy observed amongst Hispanic young offenders, different views could be considered. It might be the case that this reflects a hypothetical lower effectiveness of procedural justice amongst groups of the population that are more dismissive of authority in question (Braithwaite and Reinhart, 2007; Braithwaite, 2009b; McCarthy et al., 2021), or amongst those who do not identify with the social group represented by that authority (Bradford, 2014; Murphy, 2016; Murphy and Cherney, 2011b). This would also resonate with Australian studies that have found similar weaker associations between procedural justice and cooperation with the police in minorities (Murphy, 2015; Murphy and Cherney, 2011a,b). However, it is important to underline that we only found a moderating effect for just one ethnic minority group across four different models where ethnicity was considered.

It is also worth reflecting about the higher between person variability observed in the sample of adolescents compared to that observed for the sample entirely composed of adults. This finding conforms well with Tyler's view of procedural justice as a relational model based on identification theories (Tyler, 1997; Tyler and Lind, 1992; Tyler, 2003). As recently articulated by Trinkner (2019) Tyler's identity-based relational model predicts that people will be more concerned about treatment in contexts where treatment has identity implications, which explains the variability of procedural justice detected across countries in the literature. We believe that the same identity-based considerations could be explaining the between person variability detected in our study, which are only visible once we take a longitudinal perspective, and especially at key developmental stages like adolescence and early adulthood, where identity formation is known to be more fluid (McAdams and Olson, 2010; Meeus, 2011).

## 5.2 Policy Considerations

Even though our results point to the presence of a substantial amount of variability in the within-person association of procedural justice and legitimacy, we find that for most people perceptions of procedural justice are positively associated with legitimacy and compliance. As such there is no reason why different authorities should stop striving to ensure that their interactions with citizens are based in principles of fairness. At a time when trust in government institutions is in crisis (Centre, 2015; Hough et al., 2010), procedural justice is one of the few tools at the disposal of those

institutions to fight this problem. Yet, our findings suggest that there are benefits to be obtained if we can identify the contexts and individuals for whom procedural justice is more effective (Cherney and Murphy, 2011).

In the search to enhance legitimacy and compliance, common sense dictates that we should be focusing attention on those individuals for whom the biggest gains can be achieved. Hough et al. (2010, p. 209) pointed at the need to “*direct attention to ‘confidence building’ amongst those parts of the population whose commitment to the rule of law is more tentative*”. However, our findings show how such a strategy might not always be effective, and in some instances may even be counter-productive. In the case of interactions with the tax office Braithwaite and Reinhart (2007) hypothesise that for individuals who dismiss its authority procedural justice can be perceived as an empty ploy, or even a sign of weakness. Hence, in identifying the groups in need of special attention we should not only focus on those for whom perceptions of institutional legitimacy or compliance with its norms are relatively lower, but we should also consider how they respond to interactions with agents of the relevant authority, even when those interactions are governed by principles of fairness. One particular group that meet those two criteria are prolific young offenders. They are defined by low levels of compliance (high offending) and, according to our findings, a particularly strong procedural justice association with compliance.

### 5.3 Limitations and Future Directions

To facilitate the identification of those factors moderating the effect of procedural justice future work on the invariance thesis could adopt a more exploratory approach. To do so the modelling strategy suggested here represents a useful tool, especially given its capacity to explore multiple potential moderating factors simultaneously. This strategy is however limited to the consideration of time-invariant factors. Further work would be necessary to explore the effect associated with time-variant factors, for which alternative longitudinal modelling strategies would be required.

In this study we have followed Wolfe et al.’s (2016) conceptualisation of the invariance thesis, focusing on the variability of the procedural justice model at the person level. However, much of the literature has sought to explore differences in the effectiveness of the procedural justice model between countries. The approach suggested here could be adapted to take forward such research. One ideal dataset that could be used to estimate the extent of the between country variability in the procedural justice model, and explore the factors behind it, is Jackson et al.’s (2010) Justice module in the European Social Survey.

Finally, we have based our analysis on two different datasets, each of them affected by different limitations. The Australian Tax data suffers from substantial attrition, affecting the sample’s representativeness. There are also important limitations with how procedural justice has been measured, particularly so in the Pathways to Desistance study. This data has been used at length to explore the effect of procedural justice in the literature. However, recently, McLean et al. (2019) and Pina-Sánchez and Brunton-Smith (2020) have identified problems of internal consistency and measurement invariance affecting the aggregated index of procedural justice available in the dataset. Following McLean et al. (2019) we used a more restrictive but statistically principled measure of procedural justice exclusively tapping into perceptions of equality of treatment. We also replicated our analysis using a different variable tapping on perceptions of voice. These additional analyses corroborated the main conclusions regarding to the dynamic and variant associations of procedural justice with legitimacy. Still, our measures of procedural justice in this part of the analysis fail to grasp other core elements of the concept related to quality and respect in police treatment. A similar criticism could be made of the measure of legitimacy used, which does not reflect some of

the new dimensions considered in current empirical studies on the topic, such as felt obligation to obey, or normative alignment. We therefore encourage researchers to replicate our study using other longitudinal datasets examining the procedural justice model (Murphy, 2005; Murphy et al., 2008; Murphy, 2016; Tyler et al., 1989; Penner et al., 2014; Zahnw et al., 2019). This would help with the identification of the factors behind the observed between-person variability, as well as to determine the robustness of our findings.

## 6 Conclusion

Our findings put the invariance thesis under question. Contrary to what has been recently suggested, our study indicates that Tyler’s procedural justice model is not universal. For the most part, individuals who report high perceptions of procedural justice also report higher beliefs of legitimacy and compliance. However, that relationship is not static across time, and it is in these temporal changes that we have detected substantial between-person differences. In particular, the extent to which the procedural justice with legitimacy relationship changes through time is highly variable across people, becoming negative for a significant proportion of individuals, while doubling its positive effect size for others. Such between-person variability was corroborated through the analysis of young offenders perceptions of the police in the US, but also for perceptions of the tax authority across subjects of the general Australian population.

We further demonstrate how previous research on the invariance thesis might have missed this substantial but elusive form of longitudinal between-person variability. We argue this is the result of an over-reliance on cross-sectional designs and restricting examinations of the variability of the procedural justice model to a limited list of factors. We show that those a priori relevant factors can hardly explain any of the between-person variability that we have detected.

Yet, although most of the factors examined were found non-significant, we could still identify a series of theoretically and policy relevant moderating effects. For example, we find the relationship between procedural justice and police legitimacy being substantially weaker amongst Hispanic young offenders. Whereas for the procedural justice relationship with reduced offending (used as a measure of compliance) we find a stronger association amongst the most prolific offenders and a weaker association amongst those on the other side of the spectrum.

We conclude with a call for the further exploratory research on the invariance thesis. Research efforts should be directed at identifying the factors behind the observed between-person variability. Such work will not only advance our understanding of Tyler’s procedural justice model, it will also provide clear benefits to authorities and public institutions relying on voluntary compliance.

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