Criminal thinking in a Middle Eastern prison sample of thieves, drug dealers and murderers

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Abstract

Purpose: *The Psychological Inventory of Criminal Thinking Styles (PICTS)* has been applied extensively to the study of criminal behaviour and cognition. This study aimed to explore the psychometric characteristics (factorial structure, reliability and external validity) of an Arabic version of the PICTS, to explore cross-cultural differences between a sample of Middle-Eastern (Egyptian) prisoners and Western prison samples, and to examine the influence of type of crime on criminal thinking styles.

Method: A group of 130 Egyptian male prisoners who had been sentenced for theft, drug dealing or murder completed the PICTS. Their scores were compared with the reported data of American, British, and Dutch prisoners.

Results: The Arabic PICTS showed scale reliabilities estimated by coefficient alpha comparable to the English version, and reliabilities estimated as test-retest correlations were high. Confirmatory factor analysis showed that the PICTS subscale scores of Egyptian prisoners best fitted a two-factor model, in which one dimension comprised mollification, entitlement, superoptimism, sentimentality and discontinuity, and the second dimension reflected the thinking styles of power orientation, cut-off and cognitive indolence. Observed levels of thinking styles varied by type of crime, specifically between prisoners sentenced for theft, drug dealing, and murder. Cultural differences in criminal thinking styles were also found, whereby the Egyptian prisoners recorded the highest scores in most thinking styles, while American, Dutch and English prisoners were more comparable to each other.

Conclusions: This study provides one of the first investigations of criminal thinking styles in a non-Western sample and suggests that cross-cultural differences in the structure of these thinking styles exist. In addition, the results indicate that criminal thinking styles need to be understood by the type of crime for which a person has been sentenced.

Keywords: PICTS, criminal, assessment, thinking styles, culture

Introduction

Understanding criminal behaviour requires an insight into how criminals think about themselves, about other people, and about their position within the world. Without such knowledge, any theory of criminal behaviour is inevitably incomplete. And with such knowledge, it may be possible to predict who is likely to commit a first criminal offense or likely to re-offend (e.g., Palmer & Hollin, 2004a; Walters, 1997; Walters & Elliott, 1999), and it might be possible to design more effective rehabilitation programmes for correctional settings (e.g., Walters, 2003; Walters, Trgovac, Rychlec, Di Fazio, & Olson, 2002; Wilson, Attrill, & Nugent, 2003). The potential benefits of studying criminal thinking are therefore substantial, and research in this area is increasingly attracting the attention of psychologists in the legal, forensic, and criminological divisions (for reviews, see, e.g., Eysenck, 1996; Gendreau, Little, & Goggin, 1996; Palmer, 2007; Walters, 2009a).

Despite recent advances in understanding criminal thinking, some considerable gaps in knowledge still remain. Many aspects of cognition and behaviour are, for example, subject to substantial cross-cultural differences (see, e.g., Henrich, Heine, & Norenzayan, 2010). So far, the vast majority of research into criminal thinking has focused only on prison populations in Western countries (for reviews, see, e.g., Palmer, 2007; Walters, 2006a; 2009a). It therefore remains unresolved whether previous research findings generalize more widely or whether criminal thinking styles differ across cultures. In this study, we aim to contribute by providing such data for a prison population in a Middle Eastern country (Egypt). We compare data from the Egyptian prisoners with reported data from the Netherlands, the UK, and the USA.

The existing research in this domain has assessed criminal thinking with one of four available self-report tests: the *Criminal Sentiments Scale* (CSS: Gendreau, Grant, Leipciger, & Collins, 1979; Simourd, 1997), the *Measures of Criminal Attitudes and Associates* (MCAA: Mills, Kroner, & Forth, 2002), the *Psychological Inventory of Criminal Thinking Styles* (PICTS: Walters, 1995), and the *Texas Christian University Criminal Thinking Scale* (CTS: Knight, Garner, Simpson, Morey, & Flynn, 2006). Of these, the PICTS has been the most widely used test, not only in the USA (for reviews, see, e.g., Walters, 2002b, 2006a, 2009a), but also in the UK (Palmer & Hollin, 2003, 2004a, 2004b), Ireland (Healy & O'Donnell, 2006), and the Netherlands (Bulten, Nijman, & van der Staak, 2009). This widespread use appears to be justified as the PICTS shows good psychometric characteristics across these national studies, which indicates that it provides a stable assessment of criminal thinking styles in a variety of population samples.

Overview of the PICTS

The PICTS assessment is based on the lifestyle model of criminal conduct (Walters, 1990). This model defines criminal lifestyles in terms of interpersonal intrusiveness, irresponsibility, self-indulgence, and social rule breaking, and stipulates that these behaviours arise from three influences: conditions, choice, and cognition. *Conditions* refer to the internal (e.g., heredity), external (e.g., family), or interactive (person *and* situation) influences that shape individual behaviours, while *choices* reflect the range of options that are available to a person in life. Finally, *cognition* refers to the explanations and rationalizations of choice decisions in order to reduce or even eliminate

any feelings of guilt that might arise from these. These three influences are seen to be interdependent, but the cognition component appears to play a particularly decisive role. For example, while cognition processes may provide a retrospectively supportive role for specific choices, they could also affect the perception of conditions and modify ongoing decision-making processes (see, e.g., Walters, 1990, 2006b, 2009a). The general purpose of the PICTS is, therefore, to assess the cognition influence.

The PICTS measures eight different thinking styles: mollification (Mo), power orientation (Po), entitlement (En), cut-off (Co), superoptimism (So), cognitive indolence (Ci), sentimentality (Sn), and discontinuity (Ds). Brief descriptions of these thinking styles are provided in Table 1 (for a fuller description, see, e.g., Walters, 1995, 2002b, 2009a). Factor analyses of these thinking styles have led to several structural models of the PICTS, across different studies. In the original validation study, Walters (1995) identified a four-factor model as the basis for understanding criminal thinking. In this model, the first factor ("problem avoidance") describes a general tendency to ignore problems by eliminating them from consideration (Co), finding shortcuts (Ci), or by being easily distracted (Ds). The second factor ("inter-personal hostility") is not associated with any of the eight sub-scales but appears to reflect hostility and arrogance according to the individual questionnaire items which loaded on this factor. The third factor ("self deception") involves self-deception (En), over-estimation of getting away with criminal behaviour (So), and justification of irresponsible acts (Mo). Finally, the fourth factor ("denial of harm") describes a tendency to ignore, deny or minimize the harmful consequences of criminal behaviour.

Subsequent studies have, however, suggested different numbers of factors to explain variance in the PICTS. Egan, McMurran, Richardson and Blair (2000), for example, performed a principal-components analysis on the eight PICTS styles using the same data as in Walters's (1995) study and argued that only two principal components explained most variance. Of these, the first principal component described a lack of thoughtfulness and was formed by six thinking styles (Ci, Co, Ds, Mo, Sn, and So), whereas the second component, labeled willful hostility, was formed by four thinking styles (En, Mo, Po, and Sn). However, this solution is unlikely to be a viable alternative model for the PICTS due to the inappropriateness of the employed analyses (i.e., principal-components analysis where factor analysis was called for, varimax rotation where an oblique rotation would have been more appropriate).

In subsequent work, Walters (2005) also re-examined the factorial structure of the PICTS using new samples of male and female American adult prisoners. In this study, a four-factor model again achieved the best fit. This model appears to consist of two *primary* factors, which reflect problem avoidance and self-assertion/deception, and two *secondary* factors reflecting interpersonal hostility and denial of harm (Walters, 2005). Further factorial studies have conceptualized criminal thinking as a higher order construct that is supported by proactive and reactive criminal thinking (Walters, 2007a, 2008, 2009b). These two factors distinguish instrumental prisoners, who are more likely to plan crimes in advance and aggress against strangers, from impulsive individuals, who are more likely to react against acquaintances in response to provocation (Cornell et al.,

1996). Within the PICTS, the factor of self-assertion/deception appears to provide a good proxy for proactive criminal thinking based on its association with mollification, entitlement, and superoptimism, while problem avoidance seems to capture reactive criminality due to its association with cutoff, cognitive indolence, and discontinuity (Walters, 2008).

More recently, Walters, Hagman, and Cohn (2011) have applied confirmatory factor analysis to categorical item responses (item response theory) to provide a further assessment for the structure of the PICTS. This approach has provided preliminary support for a hierarchical structure, with general criminal thinking (GCT) at the top, proactive and reactive criminal thinking in the middle, and individual PICTS items at the bottom of the hierarchy. Items measuring four styles (mollification, entitlement, power orientation, and superoptimism) largely loaded on the proactive factor, and items measuring three styles (cutoff, cognitive indolence, and discontinuity) formed the reactive factor, while items from the PICTS sentimentality scale were poor indicators of general criminal thinking.

Cross-national investigations on the PICTS

The factorial studies reviewed so far were conducted using American prisoners. However, it appears possible that the factor stucture of criminal thinking as measured by the PICTS may vary according to the cultural context in which this assessment is obtained. For example, Palmer and Hollin (2003) argued that only one factor was sufficient to explain variance in eight clinical scales of the PICTS in a sample of English adult prisoners. However, this study employed principal-components analysis with

varimax rotation, which is not a suitable technique for identifying common sources of variance in correlated scales (e.g., Borsboom, 2006). With a sample of young English prisoners, Palmer and Hollin (2004b) also extracted two principal components, indicated by five (cutoff, power orientation, superoptimism, cognitive indolence, and discontinuity) and three (mollification, entitlement, and sentimentality) thinking styles, respectively. This same two-component solution was then replicated using a population of Dutch prisoners (Bulten et al., 2009). However, due to the psychometric inappropriateness of the above analyses, the jury is still out on the factorial structure of criminal thinking styles as measured by the PICTS in non-American populations.

In addition to structural differences, cross-cultural differences in the levels of thinking styles also appear to exist in criminal thinking styles. In one notable study, Palmer and Hollin (2003) compared English and American adult male prisoners using the descriptive statistics reported in Walters's (1995) original study. This comparison showed that English prisoners scored higher than American prisoners in all criminal thinking styles except for sentimentality. In a subsequent study, Bulten et al. (2009) reported a further comparison of Dutch, American and English prisoners, by combining the means and standard deviations that were reported by Walters (1995) and Palmer and Hollin (2003) with data from a Dutch sample. In contrast to Palmer and Hollin (2003), however, Bulten et al. (2009) only used Walters's (1995) data of maximum-security prisoners for these comparisons. As a consequence, Bulten et al. (2009) found no differences between the English prisoners and this selection of American prisoners. By contrast, the Dutch prisoners scored lower than American and English prisoners in entitlement, cognitive indolence, and cut-off, and also lower than the American sample in superoptimism.

Taken together, these findings therefore suggest that cultural differences in criminal thinking styles might exist. Unfortunately, such comparisons are still limited to a small selection of Western countries. A recent investigation into the link between criminal thinking and emotional intelligence has begun to extend research in this field to a small sample of Arab prisoners (N = 56), but this work is still very limited (Megreya, 2013). As a consequence, the extent to which current knowledge of criminal thinking styles can be generalized more widely, to prison populations in non-Western cultures, remains largely unknown.

Type of crime as a moderator of criminal thinking styles

There is, as far as we know, also only very limited information as to whether any differences in criminal thinking styles might be related to the type of crime that a person has committed (for a review see, e.g., Walters, 2006a). This is an important issue. Capturing the differences between distinct types of crime is not only essential for the implementation of any credible justice system, but this might also be central to explaining differences in the data between studies that have investigated criminal thinking. Palmer and Hollin (2003) suggest, for example, that type of crime might account for the discrepancies found between the PICTS scores of English and American prisoners. In line with such reasoning, there is evidence that prisoners sentenced for violent crimes score higher on a criminal attitude test than prisoners convicted for nonviolent offences (Polaschek, Collie, & Walkey, 2004). Similarly, it seems possible to predict re-offending for violent but not for non-violent crimes (Simourd & van de Ven, 1999). These studies therefore suggest that criminal thinking should be studied also by type of crime to

understand whether particular thought processes contribute to specific criminal activities (for similar suggestions, see, e.g., Walters et al., 2011).

Research objectives

In the present study, we administered the PICTS to a Middle Eastern (Egyptian) sample of adult male prisoners to begin to investigate these outstanding questions. Our first aim was to test the basic psychometric characteristics of the PICTS with a non-Western prisoner sample, and to explore the factorial model that best fits data from this population. Secondly, we wished to investigate any potential differences in criminal thinking between this Egyptian prison sample and American (Walters, 1995), English (Palmer & Hollin, 2003), and Dutch (Bulten et al., 2009) samples. Finally, we sought to examine whether criminal thinking styles vary as a function of type of crime, by comparing prisoners who had been sentenced for theft, drug dealing or murder.

Method

Participants

This study was approved by an Egyptian University and the prison branch of the Interior Ministry of Egypt. A total of 750 detainees are typically housed in a Public Prison in Egypt for the execution of judicial rulings of imprisonment or for awaiting trial. Although it is difficult to obtain a precise figure, this prison population includes hundreds of illiterates. We only invited prisoners who had already been sentenced and had at least an intermediate level of education to participate in this study, by advertising with posters in the prison. According to the prison's rules, no fees or other reward could be given for

participation, and this information was included on the advert. One hundred and ninety-five prisoners approached us to participate. Of these, 37 had been sentenced for between 3 and 6 months for signing cheques exceeding their bank balances. These prisoners had no history of crime and considering that such offences were unlikley to result in prison sentences in the western world, we decided to exclude these individuals from this study. In addition, we excluded 16 prisoners who failed to complete all test items on the PICTS. Of the remaining prisoners, the majority could be classified into three categories, namely offences related to theft, drug dealing, and murder, whereas 12 prisoners were sentenced for a wide variety of offences and were therefore also excluded from this study. Table 2 provides demographics for the thieves, drug dealers and murderers. All of these prisoners had good reading ability (as reflected from the years in education provided in Table 2).

It is important to note that there is no regular screening for mental disorders in Egyptian prisons. Persons who are suspected to suffer from mental illness during criminal proceedings are refered to a state hospital for assessment. Perpetrators who are diagnosed with mental disorders at this stage (except neurotic disorders) are not send to prison but instead serve out their criminal sentences in a secure mental health institution. In addition, prison inmates are referred for mental health assessments if they are deemed to show abnormal behaviour by prison staff. None of the participants in this study had been diagnosed with mental disorders according to these methods.

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Measures

The PICTS

The PICTS is an 80-item self-report measure, which consists of two validity scales, the Confusion-revised scale (Cf-R) and the Defensiveness-revised (Df-R) scale, and eight thinking-style scales (see Table 1). Each of the thinking-style scales consists of eight individual items; and responses to each item are made on a four-point Likert scale (strongly agree, agree, uncertain, and disagree).

For this study, version 4.0 of the PICTS (Walters, 2001) was adapted from English into Arabic. Two independent translations were obtained, from the first author of this study and from a professional translator who had no prior experience with the test. These two Arabic versions were then compared with each other and with the original PICTS to check for the accuracy of translation to compile a final version of the questionnaire. This forward translation method by two independent translators (the committee method; van de Vijver & Leung, 1997) with subsequent judgemental review was deemed superior to the popular back-translation method for the following reasons. The back translation method 'puts a premium on literal translation' (van de Vijver & Leung, 1997; p. 39), whereby word-for-word translations rather than translations that capture the essence and the meaning of the behaviour in question are preferred. Capturing the essence of concepts described by each questionnaire item becomes even more crucial when translations into languages from very different linguistic families are conducted. Linked to the literal translation problem is the fact that the back-translation method tends to miss serious problems in the translated version because the back-translator compensates for any errors by 'recovering' the original phrase into the source language (Grisay, 2003; Hambleton, 2005; van de Vijver & Leung, 1997).

Procedure

The PICTS was administered in small groups, which did not exceed five prisoners, in the prison's library. Two social-service specialists assisted in recruiting prisoners to the testing room. The prisoners were then asked to read a consent form and to sign it if they were willing to participate in the study. This consent form included a summary of the nature and purpose of the study, and confidentiality was also assured. Specifically, participants were informed that they were not required to write their name or any other identifying information on the study materials, that they had the right to withdraw from the study at any time, that their data was collected exclusively for research purposes, and that only the researchers would have access to their data. The PICTS was then administered according to the original instructions ("The following items, if answered honestly, are designed to help you better understand your thinking and behaviour. Please take the time to complete each of the eighty items on this inventory using the four-point scale defined below"). In order to examine the test-retest stability of the Arabic version of the PICTS, a sub-sample of 30 prisoners was asked to complete this inventory twice, within a two-week interval.

Results

Descriptives

The summary statistics for all of the PICTS variables are shown in Table 3. The standard deviations and the range in values indicate that prisoners varied considerably in their responses. However, a series of one-sample Kolmogorov-Smirnov tests shows that

these individual differences fit normal-distribution curves (*Z* scores ranged from 0.70 to 1.80, all *p*s > 0.05).

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Psychometric characteristics of the PICTS

Reliability

The reliability of the Arabic PICTS was examined using Cronbach's alpha and test-retest correlations. We provide alpha coefficients for comparability with existing reports on the PICTS[1], although better estimates of reliability exist such as McDonald's Omega (McDonald, 1999). The results of these reliability analyses are summarized in Table 3 and reveal a very high internal consistency level for general criminal thinking (α = 0.91), but moderate levels across the PICTS sub-scales, with alphas ranging from 0.53 to 0.68. Test-retest estimates for subscales were higher, with individual *r* values ranging from 0.82 to 0.90 across all subscales.

Inter-scale correlations

Table 4 shows the inter-scale correlations between all of the eight criminal thinking styles. All of these styles correlated positively and significantly with each other (all *p*s < 0.01). The correlations were moderate (ranging from 0.24 to 0.66, with the median correlation of 0.51).

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[1] Alpha underestimates test reliability unless very stringent conditions are met, namely, the test items have to conform to a single-factor model with equal factor loadings (tau-equivalent items).

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Factor analysis

To assess the homogeneity (unidimensionality) of adapted scales, we fitted single-factor models to categorical item responses making up each of the 8 scales, one at a time. Testing was performed on polychoric correlations in Mplus version 7 (Muthen & Muthen, 2012), using a diagonally weighted least squares estimator. Fit of the factor model for each scale is reported in Table 5. It can be seen that Arabic versions of scales mollification, power orientation, cognitive indolence and discontinuity were confirmed unidimensional; sentimentality closely approached unidimensionality; and entitlement and superoptimism showed relatively minor problems. Only scale cutoff departed from unidimensionality, and further analysis indicated that the problem was down to two items, item 20 and item 40 having substantially correlated residuals.

--------------- TABLE 5 HERE PLEASE ---------------

The sample size in this study (N=130) was too small to perform factor analysis on the item-level data due to a very high number of estimable parameters compared to the number of subjects in the sample. Since the individual scales have been shown to largely conform to single-factor models, we chose to work with the summated scores for each of the eight subscales instead. To examine the factorial structure of the eight criminal thinking styles, we tested a series of factor models assuming continuous variables and using the maximum likelihood estimator. We began by testing a hierarchical model of

criminal thinking, which was recently suggested based on an American sample (Walters et al., 2011). According to this model, 'general criminal thinking' is a factor at the top of a hierarchy, indicated by a 'proactive' factor (comprising mollification, entitlement, power orientation, and superoptimism items), a 'reactive' factor (comprising cutoff, cognitive indolence, and discontinuity items), and sentimentality, which was modeled as another indicator of the general factor. This hierarchical model was not supported by our data ($\chi^2 = 62.6$, $df = 18$, $p < 0.0001$, RMSEA = 0.138, CFI = 0.906). The main source of misfit was the lack of connection between power orientation and the 'reactive' factor, as indicated by modification indices obtained for the model (χ^2 change = 32.02).

In order to find a more suitable structure, we first established the number of factors underlying our data. Parallel analysis (e.g., Hoyle & Duvall, 2004) suggested presence of two factors. An oblique rotation of two factors yielded a nearly independent clusters structure. The first factor was indicated by mollification, entitlement, sentimentality, superoptimism and discontinuity; the second factor was indicated by cutoff, power orientation, and cognitive indolence.

Constraining the above model to conform strictly to the independent clusters structure described above (i.e., allowing no cross-loadings), we confirmed that the model with two correlated factors indicated by mollification, entitlement, sentimentality, superoptimism and discontinuity; and cutoff, power orientation, and cognitive indolence, respectively, fitted the data well ($\chi^2 = 26.9$, $df = 19$, $p = 0.106$; RMSEA = 0.057, CFI = 0.98). Table 5 provides the standardized factor loadings for this model. The two factors correlated strongly at 0.77 (this is the estimated correlation between the latent factors, not attenuated by unreliability).

Criminal thinking styles as a function of the type of crime

To examine whether criminal thinking styles vary as a function of the type of crime for which a prisoner has been sentenced, a series of one-way between-subject analysis of variance (ANOVA) was carried out. These ANOVAs separately compared the scores for each of the PICTS subscales for the prisoners sentenced for theft, drug dealing or murder. The results of this analysis are presented in Table 6. There were significant main effects for all PICTS scales except for cognitive indolence. In order to reduce the possibility of a Type I error due to the multiple comparisons, a Bonferroni corrected alpha was used with the post-hoc test (Tukey HSD) so that p values were considered significant only if they were below 0.005 ($p = 0.05/9$ variables). The results showed that drug dealers scored higher than murderers on entitlement, and higher than thieves on general criminal thinking, sentimentality, and superoptimism. In addition, murderers scored higher than thieves in cut-off. No other significant differences were found.

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Cross-cultural comparisons

Following previous research (Bulten et al., 2009; Palmer & Hollin, 2003), we compared the current cohort of Egyptian prisoners with the reported PICTS data of American (the American maximum-security data; Walters, 1995), English (Palmer & Hollin, 2003), and Dutch prisoners (Bulten et al., 2009). A series of one-way between-subject ANOVAs, based on the means and standard deviations of the current sample and

the corresponding values reported in previous work, showed cross-cultural differences

between these four national groups in all criminal thinking styles, except for

superoptimism (see Table 6). Tukey HSD tests (Bonferroni corrected) revealed that

Egyptian prisoners scored higher on mollification, entitlement, power orientation,

sentimentality, and discontinuity in comparison to American, English, and Dutch

prisoners. Moreover, the Egyptian prisoners also scored higher on cognitive indolence

and cut-off than the Dutch prisoners. In addition, the English prisoners scored higher than

the Dutch prisoners in cognitive indolence. Finally, the American prisoners showed

higher levels of entitlement than the Dutch prisoners. No other cross-cultural differences

were found. For full details of this analysis, see Table 7.

--------------- TABLE 7 HERE PLEASE ---------------

Discussion

This study applied an Arabic version of the PICTS to a sample of Egyptian

prisoners. We sought to explore the psychometric characteristics of this version of the

PICTS and the construct of criminal thinking that it can provide for an Arabic sample. In

addition, we also examined whether criminal thinking styles vary across three different

offences (theft, drug dealing, and murder), and across different cultures by comparing the

data from Egyptian prisoners with previously published data from the USA (Walters,

1995), the UK (Palmer & Hollin, 2003), and the Netherlands (Bulten et al., 2009).

In this translated version of the PICTS, the internal reliability levels (measured by

alpha) across all of the criminal thinking styles were moderate and similar to the levels

reported in the original validation study (Walters, 1995) and other cross-national investigations (Bulten et al., 2009; Healy & O'Donnell, 2006; Palmer & Hollin, 2003). However, general criminal thinking was measured with a very high level of reliability. In addition, the current and historical criminal thinking scales also showed high levels of internal consistency that converge with previous studies (Walters, 2006b, 2007a). The two revised validity scales (Cf-R and Df-R) also showed higher rates of internal consistency than the original measures (Palmer & Hollin, 2003; Walters, 1995), which supports this particular revision (version 4.0) of the PICTS (see Walters, 2001). In addition, the two-week test-retest stability was very high for all PICTS scales.

The influence of culture on the PICTS

The factor analysis of the PICTS for the current sample of Egyptian prisoners produced a two-factor solution, in which one factor was associated with the criminal thinking styles of mollification, entitlement, sentimentality, superoptimism and discontinuity, whereas the second factor was indicated by cutoff, power orientation, and cognitive indolence. Two-factor solutions for the PICTS have been reported widely (e.g., Egan et al., 2000; Bulten et al., 2009; Palmer & Hollin, 2004b; Walters, 2005; Walters, 2011), although the combination of thinking styles that loads onto these factors has varied across studies. Broadly, in all of these solutions, one style appears to be associated with a lack of thoughtfulness, or reactive behaviour, while the other appears to reflect more wilfull, proactive hostility.

A similar distinction might fit our own data. For example, we found that mollification, entitlement and superoptimism all loaded onto one factor in this sample.

These thinking styles reflect a justification of criminal behaviour by external factors, an attitude of deservedness or ownership, and an overestimation of the negative consequences that might arise from criminal behaviour, and therefore reflect different facets of a proactive criminal thinking style (see, e.g., Walters et al., 2011). We also found that cut-off and cognitive indolence loaded onto a second factor. These thinking styles reflect more impulsive behaviours, such as the rapid elimination of emotions through criminal behaviour, short-cut problem solving, and the uncritical acceptance of ideas, and are indicative of a more reactive thinking style. These findings therefore seem to fit to a considerable extent with a two-factor solution along proactive and reactive dimensions of criminal thinking. Overall, however, the exact combination of thinking styles that loaded onto these factors in the current sample also differed from previous studies (c.f., Egan et al., 2000; Bulten et al., 2009; Palmer & Hollin, 2004b; Walters, 2005). Ultimately, our findings therefore add to a body of data, which suggests that slightly different factor structures might fit the PICTS depending on the specific context for which criminal thinking styles are measured.

One contextual factor that may contribute to this variety of outcomes appears to be related to the nationality of prisoners, as different factor structures are required to best model the data of American (Egans et al., 2000; Walters, 1995, 2005), Dutch (Bulten et al., 2009), English (Palmer & Hollin, 2003) and Egyptian (the present study) adult prisoners. This suggests that culture might be one of the key influences that affect the factorial structure of the PICTS. Further support for this suggestion comes from the cross-cultural comparisons that were made among American, English, Dutch, and Egyptian prisoners in this study, which revealed differences between nationalities in all

criminal-thinking styles, except superoptimism (see Table 7). Specifically, we found that Egyptian prisoners recorded the highest scores in most thinking styles, whereas Dutch prisoners generally obtained the lowest scores. The American and English prisoners also recorded higher scores than Dutch prisoners on some selected thinking styles (entitlement and cognitive indolence; see Table 7), but were highly comparable to each other.[2]

At present, we are unable to explain the comparatively high PICT scores in the Egyptian sample. However, it is conceivable that these scores arise from the characteristics of Egyptian prisons, where large numbers of prisoners are usually housed in a single living quarter (typically more than twenty-five criminals are housed together). Under these conditions, prisoners who have been sentenced for a variety of different crimes are often crowded together, which might allow the exchange and sharing of diverse life (and crime) experiences, and encourage the competition for living essentials, the use of power to exert dominance, and sexual harassment. We do not possess comparable experience of prison environments in other countries but it is possible that the difficult environment of a Middle Eastern prison, as has been described to us by many of the Egyptian prisoners who participated in this study, could support criminality and generally foster criminal thinking styles, rather than provide effective rehabilitation.

Another possible explanation for the high PICTS scores of the Egyptian participants might be related to the crimes that these prisoners had committed in

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[2] Note that this similarity between the American and English PICTS data does not contradict the results of Palmer and Hollin's (2003) study, which showed that English prisoners scored higher than American prisoners in all criminal thinking styles except for sentimentality. This discrepancy arises because Palmer and Hollin (2003) used the entire sample from Walters's (1995) study for comparison. In contrast, the present study, and also Bulten et al.'s (2009) study, used only one of the three groups of prisoners (the maximum security population) from Walters's (1995) study. This maximum security group was selected for this comparison due to the similarity of its general characteristics to the sample of the present study.

comparison to studies conducted in other countries (for similar suggestions, see Palmer &

Hollin, 2003). For instance, almost 31% of participants in the Egyptian sample had been

imprisoned for theft and an equivalent proportion had been sentenced for murder, while

39% were convicted for drug dealing. By comparison, 44% of the American sample had

been convicted for robbery and 61% of the Dutch sample had been convicted for violent

offences, while a wide variety of offences was represented within the English sample,

with the most common convictions for violent offences (28%) and burglary, theft and the

handling of stolen goods (23%). Interestingly, the comparison between thieves, drug

dealers, and murderers in the present study showed that drug dealers provided the highest

scores on most criminal thinking styles whereas the thieves had the lowest. This variation

of criminal thinking styles as a function of type of crime could explain why the total

Egyptian sample (which contained a large proportion of drug offences) recorded higher

PICTS scores than the American sample (which contained mostly theft crimes) and the

English and Dutch samples (which included none or only very few drug offences).

However, these are obviously speculative explanations for the cross-cultural differences

in criminal thinking styles and further research is clearly needed to put these to test.

At this stage, we would recommend caution in interpreting these cross-cultural

differences for another reason. In these comparisons, and particularly those in which

measurement tools require translation into languages of different origins (e.g., from

English to Arabic), it is inherently difficult to establish measurement equivalence (see,

e.g., van de Vijver & Leung, 1997; van de Vijver & Poortinga, 2005). This applies not

only to the questionnaire items but also to the rating scales. For example, the response

categories on the Arabic PICTS may have slightly different strengths compared to the

English version, which could shift the response scale and render cross-cultural comparisons of quantitative differences (e.g., mean values, as in Table 7) quite meaningless. We are aiming to address these issues as more data from Egyptian prisoners becomes available, as this is clearly an important topic for further work. Despite these caveats, the current data is of considerable significance because it provides a so far unique insight into cross-cultural differences in criminal thinkling styles between Western and non-Western prison populations.

Type of crime and the PICTS

To our knowledge, the relationship between criminal thinking styles and type of crime has so far not been investigated systematically. The data from the Egyptian prisoners therefore also provides several novel insights into this matter. For example, these data suggest that cognitive indolence, that is, a tendency for short-cut problem solving and the uncritical acceptance of ideas, is the only factor that does not vary across the three crime categories considered here. By contrast, cut-off, which represents the elimination of negative emotions through criminal behaviour, differed markedly across all three crime categories and increased in magnitude with crime severity (i.e., lowest for theft, higher for drug dealing, and highest for murder). This finding appears to converge with other studies that have also reported high levels of cut-off in crimes of murder (see, e.g., Guttmacher, 1960; Hickey, 2006; Stone, 1998).

In addition, several other thinking styles also appear to differ according to type of crime. For example, high levels of entitlement, superoptimism, and discontinuity appear to be characteristics of drug dealing, as these thinking styles are enhanced in these

individuals in comparison to thieves and murderers. This suggest that the criminal

tendency to deal drugs might be supported by a misplaced sense of deservingness, a

difficulty of following through on good intentions, and the belief that this type of crime is

unlikely to be punished. By contrast, power orientation, which refers to the aggressive

control of people and situations, is elevated in murderers compared to thieves, and may

support the life-destroying nature of these specific criminal offences.

This variation in criminal thinking styles as a function of type of crime was also

evident from the general criminal thinking (GCT) scale, which was added to the original

PICTS during later development phases (see, e.g., Walters, 2009a). The GCT possesses

some important qualities, as it appears to be one of the most effective predictors of

institutional adjustment and recidivism (e.g., Walters, 2007a, 2007b; Walters & Mandell,

2007). In the current study, murderers and drug dealers recorded comparable scores on

this scale, and both of these groups recorded higher scores than thieves. These differences

might perhaps arise because the thieves were simply more "minor" criminals, who

generally committed fewer or less severe offences. This suggestion receives some support

from the prison sentences for these two groups of criminals, which were much shorter in

duration for the thieves (see Table 2).

Limitations of the study

This study is not without limitations. Compared to research with prisoners from

the USA, UK, and the Netherlands, our sample size is relatively small (see, e.g., Bulten et

al., 2009; Palmer & Hollin, 2003; Walters, 1995) and decreases further still when the data

is broken down by type of crime. Our participant pool of Egyptian prisoners represents

one of the first non-Western samples in the study of criminal thinking (see also Megreya, 2013), and this small sample size partly reflects the lack of an established infrastructure for conducting such research in judicial settings in Egypt. Data collection was disrupted further by the 'Arab spring' and it remains currently impossible to add to this participant sample. In addition, our findings are also restricted to adult male prisoners and the three types of crime under investigation here. These methodological concerns clearly limit the generalizability of this study, so it remains to be seen if similar patterns can be replicated in other populations. A further caveat exists for our analysis by type of crime, which focused only on offences for which the participants were currently imprisoned. We were unable to establish the full criminal background of these prisoners, but it seems likely that at least some may have committed a variety of crimes. Accordingly, the type of crime data should be viewed with some caution.

Finally, while we have been able to use the Arabic PICTS to measure criminal thinking in an Egyptian prison sample, an important outstanding question is whether this version of the PICTS also has clinical utility, by predicting recidivism in samples from the Middle East. Investigations of prisoners in the USA suggest that the PICTS is capable of predicting reconviction (e.g., Walters, 2007b, 2009c, 2011, 2012). However, the extent to which these findings generalize to other prison samples, outside the USA, awaits further clarification (see, e.g., Palmer & Hollin, 2004a; Walters, 2012).

Despite these limitations, we believe that this research contributes some novel perspectives on a topic that has so far been studied only within populations of Western prisoners. Human cognition and behaviour is subject to substantial cross-cultural differences (see, e.g., Henrich et al., 2010), and it is not at all clear whether existing

research on criminal thinking styles, with its focus on Western prison populations, is more widely generalizable. Our study provides a valuable starting point here.

Conclusions

This study provides evidence that the PICTS is a suitable test for measuring criminal thinking in Egyptian adult male prisoners, which indicates that this assessment might be universally useful for assessing criminal thinking. In turn, this study also provides the first data on criminal thinking styles for a non-Western prison sample and shows that criminal thinking styles may vary across cultures. In addition, our findings also indicate that criminal thinking styles may vary in people committed for different types of crime, and suggest that this could explain some cross-cultural differences in the data. This novel, and so far unique, non-Western prison sample in the criminal thinking literature therefore raises many important questions for further research.

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TABLE 1. Brief Descriptions of the Eight Criminal Thinking Styles and Associated

PICTS Example Items (Based on Walters, 1995)

Mollification	The justification of behaviour by external factors and the projection of blame onto the victims. "*I have told myself that I would never have had to engage in crime if I had had a good job*".
Power orientation	The aggressive control of people and situations. "*When not in control of a situation I feel weak and helpless and experience a desire to exert power over others*".
Entitlement	The misidentification of 'wants' as 'needs', with an attitude of ownership and privilege. "*The way I look at it, I've paid my dues and am therefore justified in taking what I want*".
Cut-off	The rapid elimination of negative emotions (such as fear and anxiety) through criminal behaviour or drug use. "*I have used alcohol or drugs to eliminate fear or apprehension before committing a crime*".
Superoptimism	The overestimation of the avoidance of negative consequences for a criminal behaviour. "*The more I got away with crime the more I thought there was no way the police or authorities would ever catch up with me*".
Cognitive indolence	A pattern of lazy thinking, short-cut problem solving, and uncritical acceptance of ideas or plans. "*I tend to put off until tomorrow what should have been done today*".
Sentimentality	The attempt to atone for negative feelings following criminal behaviour by performing various good deeds. "*As I look back on it now, I was a pretty good guy even though I was involved in crime*".
Discontinuity	Reduced premeditated thought, increased susceptibility to disruption, and a difficulty of following through on good initial intentions. "*There have been times when I have made plans to do something with my family and then cancelled these plans so that I could hang out with my friends, use drugs, or commit crimes*".

TABLE 2. The Demographic Characteristics of the Participant Sample

	Total	Murder	Drug dealing	Theft
Sample size	130	40	50	40
Age in years	38 (12)	34.5 (12.1)	38.3 (12.2)	41.2 (11)
Education in years	12.2 (2.7)	11.1 (2.5)	11.9 (2.5)	13.7 (2.5)
Sentence in months	109.5 (88)	153.6 (97.1)	117.2 (85.6)	55.9 (44.5)
Duration in prison at test	54.4 (63.2)	75.8 (85.1)	64.6 (54.8)	20.1 (20)
Marital status				
Single	46	22	20	4
Married	73	16	23	34
Divorced	11	2	7	2
Residence				
Rural	38	21	4	13
Urban	92	19	46	27

Note: Mean values are provided for age, education, sentence and duration in prison (standard deviations in parentheses). Marital status and residence data are based on frequencies.

TABLE 3. Descriptive Statistics for all PICTS Variables in the Egyptian Prison Sample and the Test-retest Correlations (Pearson's r) and Internal Consistency Reliabilities

	Mean	SD	Range	Z	Internal Consistency Cronbach's Alpha (N=130)	Two-Week Test-Retest (N=30)
Confusion-Revised	17	4.6	8-29	0.89	0.56	0.87
Defensiveness-Revised	20	5	8-32	1.02	0.64	0.83
General Criminal Thinking	138.6	27.7	81-206	0.73	0.91	0.84
Mollification	17.1	4.9	8-28	1.08	0.57	0.85
Cutoff	16.6	5.1	8-29	1.17	0.68	0.82
Entitlement	16.9	4.2	9-29	1.42	0.53	0.87
Power Orientation	17.1	4.9	8-29	1.71	0.65	0.88
Sentimentality	19.5	4.7	9-30	0.70	0.60	0.85
Superoptimism	15	4.6	8-27	1.27	0.61	0.90
Cognitive Indolence	17.9	4.5	8-29	0.89	0.53	0.86
Discontinuity	18.4	4.6	10-30	0.79	0.55	0.86
Current Criminal Thinking	30.2	7	15-46	1.14	0.70	0.61
Historical Criminal Thinking	20.8	7.6	12-40	1.64	0.82	0.87
Proactive Criminal Thinking	80.1	24.1	45-149.5	1.84	--	0.85
Reactive Criminal Thinking	96.4	23.7	50-153.5	0.77	--	0.81

Note: All test-retest correlations were significant at $p < 0.001$.

TABLE 4. Inter-scale Correlations (Pearson's r) Between the Eight Criminal Thinking

Styles

	Co	En	Po	Sn	So	Ci	Ds
Mo	0.44	0.65	0.32	0.49	0.57	0.51	0.53
Co		0.45	0.59	0.48	0.51	0.66	0.53
En			0.24	0.52	0.58	0.43	0.51
Po				0.40	0.35	0.62	0.40
Sn					0.49	0.47	0.43
So						0.54	0.53
Ci							0.52

Note: All correlations were significant at $p < 0.001$.

TABLE 5. Goodness of Fit for the Single-factor Models for Each of the PICTS

Subscales, and Standardised Factor Loadings for the Two-factor Model of the Egyptian

PICTS Scores

Scale	Goodness of Fit			Standardised Factor Loadings	
	Chi-Square (df=20)	p-value	RMSEA	Factor 1 (SE)	Factor 2 (SE)
Mo	27.3	0.126	0.053	.770 (.045)	--
Co	74.9	<0.001	0.145	--	.803 (.045)
En	41.5	0.003	0.091	.757 (.046)	--
Po	21.9	0.348	0.027	--	.706 (.053)
Sn	33.2	0.032	0.071	.665 (.056)	--
So	44.2	0.001	0.096	.760 (.045)	--
Ci	29.5	0.079	0.060	--	.848 (.040)
Ds	29.8	0.073	0.061	.703 (.052)	--

Note: All loadings were significant at $p < 0.001$.

TABLE 6. One-way Between-subject ANOVAs and Pairwise Contrasts (Bonferroni-corrected) for PICTS Measures Among Three Criminal Groups

Scales		Descriptives			F	Tukey HSD pairwise
		Murder	Drug dealing	Theft	(2, 127)	comparisons
GCT	M	141.4	147.3	124.9	8.17***	D>T; M=D; M=T
	SD	27.2	25.9	26.2		
Mo	M	16.5	18.5	15.8	3.63*	M=D=T
	SD	4.5	4.8	5		
Co	M	19.4	16.6	13.8	15.69***	M>T; M=D; D=T
	SD	4.6	4.6	4.3		
En	M	15.4	18.8	15.9	8.81***	D>M; M=T; D=T
	SD	3.7	4.3	3.8		
Po	M	19.2	16.8	15.6	6.39**	M=D=T
	SD	6.3	3.8	3.8		
Sn	M	20.3	20.9	17.1	9.12***	D>T; M=D; M=T
	SD	4.1	4.7	4.4		
So	M	14.5	17	13.2	8.68***	D>T; M=D; M=T
	SD	4.7	4.4	3.7		
Ci	M	18.6	18.4	16.6	2.92	----
	SD	5.1	3.9	4.2		
Ds	M	17.5	20.3	17	7.19**	M=D=T
	SD	3.9	4.4	4.6		

Note: M = murderers; D = drug dealers; T = thieves. For the ANOVAs, * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$. For planned contrasts, the > symbol indicates a significant difference (using a Bonferroni correction, p values were considered significant only if they were below $p < 0.005$), the = symbol indicates no significant difference.

TABLE 7. One-way Between-subject ANOVAs and Tukey HSD Post-hoc Tests (Bonferroni-corrected) for the Comparison of PICTS Scores Across Prisoners from Egypt (Current Sample), the Netherlands, the UK, and the USA

Scales		*Descriptives*				*F* $(3, 711)$	Tukey HSD pairwise comparisons
		Egypt (N=130)	NL (N=180)	UK (N=255)	US (N=150)		
Mo	M	17.1	14	14.5	14	17.28***	EG>NL, UK&US;
	SD	4.9	3	4.5	4.3		NL=UK=US
Co	M	16.6	13.6	15.2	15.2	9.08***	EG>NL; EG=UK&US;
	SD	5.1	4.6	5.4	5		NL=UK=US
En	M	16.8	12.8	13.3	14.4	28.45***	EG>NL, UK&US;
	SD	4.2	3.5	4.5	3.9		US>NL; UK=NL&US
Po	M	17.1	14.3	14	13.6	17.25***	EG>NL, UK&US;
	SD	4.9	3.8	4.8	4.6		NL=UK=US
Sn	M	19.6	17.4	17.7	18	9.89***	EG>NL, UK&US;
	SD	4.7	3.7	3.4	3.5		NL=UK=US
So	M	15	14.6	15.4	15.8	2.45	--------
	SD	4.6	3.7	4.4	4.4		
Ci	M	17.9	15.2	17.4	16.7	10.96***	EG>NL; UK>NL;
	SD	4.5	4.5	4.8	4.7		EG=UK&US; NL=US;
							UK=US
Ds	M	18.4	15.1	16.2	16.4	10.71***	EG>NL, UK&US;
	SD	4.6	4.9	5.5	5		NL=UK=US

Note: EG = Egyptian prisoners; NL = Dutch prisoners; UK = British prisoners; US = American prisoners. For the ANOVAs, * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$. For planned contrasts, the > symbol indicates a significant difference (using a Bonferroni correction, p values were considered significant only if they were below $p < 0.005$), the = symbol indicates no significant difference.