



Pathways between types of crime and criminal social identity: A network approach

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ABSTRACT

Criminal social identity (CSI) is a factor for criminal behavior. CSI should therefore be a target of interventive strategies aiming to reduce the risk of re-offending. To date, there is limited knowledge on how CSI is expressed among individuals with different criminal histories, undermining the efforts to develop and target appropriate rehabilitative strategies. In the present investigation, network analysis was applied to model the pattern of relationships between different crime types and CSI. In total, eight networks were estimated among prisoners from the USA ($n = 772$), UK ($n = 638$), and Poland ($n = 1591$).

Results show different pathways between CSI scores and crime types across samples. CSI formed positive links with acquisitive crime among U.S. and Polish male prisoners. Homicide formed negative associations with CSI among male prisoners from the USA and Poland as well as U.S. female prisoners. Crimes for which an individual is likely to face social stigmatization were positively associated with CSI in U.S. females and UK males. It is anticipated that from these results, we will be able to build a better understanding of the structural relationships between different types of criminal activity and CSI, subsequently leading to more effective rehabilitation strategies.

1. Introduction

Social identity refers to the construction of a person's self-concept based on membership to particular groups. According to Social Identity Theory, membership of a social group provides a sense of belonging, and when the in-group is evaluated in favorable terms, this contributes positively to an individual's self-esteem (Tajfel & Turner, 1979). In the event that the in-group receives an unfavorable evaluation in comparison to the out-group, *social mobility* enables a different group membership to be voluntarily assumed (Hogg & Reid, 2006). Membership of a pro-social group might be more conducive to the formation of positive evaluations, but for some individuals this option might not be available (e.g. due to peer rejection), rendering the development of a criminal social identity (CSI) more likely (Boduszek & Hyland, 2011). The

integrated psychosocial model of criminal social identity (IPM-CSI Boduszek, Dhingra, & Debowska, 2016) provides a structural explanation of the development of CSI that predominantly relies on factors that are experienced prior to incarceration (e.g. exposure to criminal peers and insufficient parental supervision).

Incarceration also reduces the opportunity for selective affiliation since individuals are involuntarily restricted to interactions with other prisoners. Rhodes (1979) demonstrated that constant exposure to other inmates increases the development of deviant attitudes, giving rise to the development of a criminally orientated view of the self. For people who cannot easily alter their group membership, a strategy of *social creativity* (e.g. through comparisons on a different dimension or with a more disadvantaged group) allows for more positive evaluations of the in-group (Tajfel, 1978), thus serving to protect the individual's self-

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esteem.

Given the importance of both cognitive and emotional factors to the formation of social identity, the construct is argued to be multi-dimensional in nature (Cameron, 2004). CSI was similarly conceived to comprise of three factors, namely cognitive centrality, in-group affect and in-group ties (Boduszek, Adamson, Shevlin, & Hyland, 2012). Cognitive centrality reflects the cognitive importance of belonging to a criminal group. Criminal identity, then, is seen as central to an individual's self-concept, which renders him or her more likely to endorse the group norms and act accordingly even in the absence of other group members. Although a relatively new concept, "centrality" is considered to be an integral component of the theory of Criminal Social Identity as it reflects the conscious, cognitive component of belonging to a criminal group. In-group affect refers to the positive emotional valence of belonging to a criminal group and is thought to develop to reduce the anxiety associated with the discrepancy between ideal and actual self by changing an individual's point of reference from wider societal norms to sub-group norms. The final factor, in-group ties, pertains to the psychological perception of resemblance and emotional connection with other members of a criminal group. Individuals with strong in-group ties are persistently readier to display behaviors condoned by the group in order to demonstrate their conformity. Demonstration of conformity to criminal standards and conduct are positively encouraged and reinforced by other in-group members, consequently leading to an increase in the frequency of criminal behavior, or an alteration of non-criminal acts into criminal ones. Thus, criminal group members do not have to apply direct persuasion in order to make an impact on another individual's antisocial attitudes or increase that person's likelihood of committing a criminal act because the necessary persuasion stems directly from in-group ties. These three aspects of CSI can be reliably assessed using the Measure of Criminal Social Identity (MCSI; Boduszek et al., 2012) and the Measure of Criminal Social Identity – Revised (MCSI-R; Boduszek & Debowska, 2017).

Therefore, the stronger the identification with a criminal group, the greater the likelihood of developing criminal thinking styles and engaging in criminal behavior in order to demonstrate conformity (Boduszek, O'Shea, Dhingra, & Hyland, 2014). Moreover, the integration of group norms and beliefs into a person's self-concept increases the likelihood of criminal behavior even in the absence of criminal group members (Boduszek et al., 2016). However, it is important to note that the socially constructed self (including a criminally orientated view of the self) is subject to reconstruction in response to changes in personal and social circumstances (Burke, 2006). A study of ex-prisoners revealed that a shift to a more pro-social identity was associated with desistance from crime (Aresti, Eatough, & Brooks-Gordon, 2010). Thus, given that CSI would appear to be a *dynamic* risk factor for criminal behavior, increasing our understanding of the association between CSI and offending patterns has the potential to inform effective targeting and delivery of rehabilitation strategies.

1.1. Criminal social identity (CSI) among populations who offend

Empirical evidence points toward a significant positive association between CSI scores and the number of arrests among male recidivists from a maximum security prison (Boduszek et al., 2014). Moreover, Sherretts, Boduszek, Debowska, and Willmott (2017) observed higher scores for cognitive centrality and in-group ties among recidivistic offenders compared to prisoners incarcerated for the first time. The researchers concluded that repeat offenders develop cognitive structures that render their identity as a criminal central to their self-concept, which could *partially* explain their re-offending.

In a report prepared for the British Ministry of Justice by Brunton-Smith and Hopkins (2013), multivariate analysis revealed that crime type was also an important predictor of proven re-offending. More specifically, those serving a custodial sentence for an acquisitive crime (e.g., theft, robbery, burglary) were more likely to re-offend than people

serving time for other types of crime. The authors speculated that this may be because sentences for acquisitive crimes are shorter than for more serious and violent offenses, providing those who specialize in acquisitive crime more opportunities to engage in criminal behavior. Given that CSI was not included as a factor in Brunton-Smith and Hopkins' (2013) analysis, another possibility is that people who commit acquisitive crimes may have higher levels of criminal identity, which can have an effect on both the initiation and perpetuation of criminal behavior. Indeed, acquisitive crime frequently involves accomplices (Fox & Farrington, 2012; National Audit Office, 2007; Weerman, 2003) and individuals spending time with accomplices develop strong social bonds with them, resulting in increased CSI (Boduszek et al., 2016).

Clemmer (1940, p. 270) emphasizes the role of prisonisation, defined as the process of "taking on, in greater or lesser degree, of the folkways, mores, customs, and general culture of the penitentiary", in the development of certain aspects of criminal identity. Walters (2003) further explains that prisoners interact with one another and assimilate into the prison culture, which, compounded by the lack of positive role models, can foster an identification congruent with crime. Indeed, Walters demonstrated that CSI increased over a six-month period of confinement in a male medium security prison among novice inmates (i.e. no previous experience of incarceration) but not among experienced inmates (i.e. with at least one prior incarceration and at least five years of prison experience). However, this observation might not be generalizable to all types of prisoners and prisons of all security levels. More specifically, prisons with a higher security classification are occupied by inmates with more serious and violent offending backgrounds, and empirical evidence indicates that inmates from these establishments have an increased rate of post-release recidivism (Auty & Liebling, 2019; Gaes & Camp, 2009; Listwan, Sullivan, Agnew, Cullen, & Colvin, 2013) as well as greater levels of institutional violence and misconduct (Bierie, 2012). Higher security prisons are also characterized by more physical security features (such as surveillance cameras and fences), stricter institutional regimes, and fewer opportunities for association among prisoners. As such, higher security prisons have been described as a "deeper" form of custody (Crewe, 2011) that is more distanced from everyday life, giving rise to different types of behavior and interactions, and consequently a different prison culture.

Although our knowledge of CSI among men is gradually increasing, our understanding of the construct among women is comparatively limited. This is because all but one of CSI studies to date have been conducted with men. In the one exception, Sherretts, Boduszek, and Debowska (2016) reported female gender as a significant predictor of increased CSI scores. Interpreted in light of prior research, women are more likely to develop a stronger sense of identification and form stronger bonds with in-group members because of an increased need to be an accepted and supported member of a group (Kiesner, Cadinu, Poulin, & Bucci, 2002; Newman, Lohman, & Newman, 2007). As such, it appears that women might be more susceptible to group socialization processes, enhancing the integration of criminal beliefs and attitudes into their self-concept.

To summarize, the relationship between CSI and offending is unlikely to be straightforward. Development of CSI is positively associated with offending histories, but having committed a crime and going to prison can also result in increased CSI, which then results in engaging in more criminal behavior. The above-cited findings also indicate that CSI can increase as a function of female gender, and that it can be expressed differently according to the preferred type of offending. However, this has only been examined at the rudimentary level of violent versus non-violent offending, and it remains unclear whether qualitative differences might exist for more specific crime types (e.g. burglary, theft, domestic violence, homicide, drug-related offenses). Therefore, the complex interplay between having committed different types of crimes and CSI remains to be empirically investigated. Traditional forms of analyses that have been used in CSI research to date, however, could not elucidate these complex connections. Therefore, we propose the use of

network approach to studying pathways between types of crime and CSI.

1.2. Network analysis

Network analysis constitutes an analytic framework used to study patterns of relationships between variables. Unlike traditional forms of analysis, network analysis conceptualizes correlations between variables as complex systems, where individual variables interact with and influence one another (Murphy, McBride, Fried, & Shevlin, 2017). At an abstract level, a network refers to a structure consisting of *nodes* and *edges*. The nodes are variables in the study, whereas edges are the correlations between the nodes. The graphical representation of the network of nodes and edges is known as a graph. Nodes can represent different types of variables, including those of continuous and categorical nature. Edges can be either weighted or unweighted. Weighted edges convey information about the magnitude of the connection between nodes. In a graphical representation of a network, the greater the thickness of a weighted edge, the thicker the line it is represented with. Depending on research questions and type of data, edges can also be directed or undirected. One head of a directed edge has an arrowhead indicating the direction of effect. In addition, a negative association between nodes is usually represented with a red line, whereas positive associations are commonly represented with a green or a blue line. Apart from visual inspection of the graph, inferences about the network structure and node importance are made using centrality measures of strength (defined as the magnitude of the association with other nodes), closeness (the inverse of the sum of the distance from one node to other nodes in the network), and betweenness (the number of times a node bridges the path between two other nodes) (Fonseca-Pedrero, 2018; Hevey, 2018).

Although network analysis is a relatively new technique in the fields of psychology and criminology, many researchers already appreciate its analytic potential to answer various research questions. Studies using network analysis have expanded knowledge in clinical psychology (e.g., Fried et al., 2017; Murphy et al., 2017), personality research (e.g., Costantini et al., 2015), and social psychology (e.g., Dalege et al., 2016). Mastrobuoni and Patacchini (2012) employed network analysis to investigate criminal ties between U.S. mafia members. Centrality measures were used to make inferences about the level of leadership exercised by different individuals included in the network.

1.3. The current study

CSI is a salient risk factor for criminal behavior but its complex, reciprocal relationship with different types of criminal behavior is not well understood. Our first objective was to observe differences in the levels of CSI between those prisoners who reported only one offense type and those who reported two, three, and four and more types of offenses. Second, network analysis was applied to model the pattern of relationships between different crime types (theft, burglary, drug-related, violent, sexual, domestic violence, other non-violent, and homicide) and CSI. Considering differences in the prison experience across countries (Akers, Hayner, & Gruninger, 1977; Watling, 2018) and institutions of varying security levels (e.g., Gaes & Camp, 2009), as well as some preliminary research findings indicating that women tend to score higher on total CSI than men (Sherretts et al., 2016), we constructed separate networks for (a) populations from different cultural contexts (USA, UK, and Poland), (b) people incarcerated in prisons of different security levels (medium and maximum), and (c) men and women. In total, eight networks were estimated. Given the pioneering nature of this investigation, we did not make any specific predictions as to the structure of these networks. However, based on prior research, we hypothesized that crime types commonly committed with accomplices (such as theft and burglary) will form positive associations with CSI. Homicide, as a crime usually committed alone, will form negative associations with CSI.

2. Method

2.1. Sample and procedure

Sample 1 consisted of 772 (males = 434, females = 338) prisoners from four U.S. state prisons (Pennsylvania) including 240 men from a maximum security prison, 187 men from a medium security prison, 233 women from a maximum security prison, and 112 women from a medium security prison. Prisoners ranged in age from 18 to 76 years ($M = 36.48$, $SD = 11.97$). The length of incarceration ranged from 1 to 564 months ($M = 93.54$, $SD = 102.13$), with 48.82% of prisoners incarcerated for violent offenses. Participants completed anonymous, pen-and-paper surveys in their living quarters. All data was collected opportunistically. Participation was voluntary without any form of reward. The research protocol was approved by appropriate institutional ethics boards.

Sample 2 consisted of 638 adult male prisoners, housed in two prisons in the North of England. Four hundred and thirty-four were housed in a Category B prison (prisoners who pose a risk to the public but may not require highest security, but for whom escape still needs to be made very difficult; referred to as a 'maximum security prison' hereafter) and 204 participants were housed in a Category C prison (prisoners who cannot be trusted in open conditions but who are unlikely to try to escape; referred to as a 'medium security prison' hereafter). Participants ranged in age from 20 to 80 years ($M = 35.86$, $SD = 11.13$). The length of incarceration ranged from 1 to 780 months ($M = 79.25$, $SD = 89.63$). Participants completed anonymous, pen-and-paper surveys in their living quarters. All data was collected opportunistically. Participation was voluntary without any form of reward. The research protocol was approved by appropriate institutional ethics boards.

Sample 3 consisted of 1591 adult male prisoners from maximum security prisons ($n = 891$) and medium security prisons ($n = 700$) based in Poland. Participants ranged in age from 18 to 76 ($M = 34.90$, $SD = 9.98$). The length of incarceration ranged from 1 to 468 months ($M = 71.45$, $SD = 71.46$). All data was collected from seven maximum and seven medium security prisons randomly selected for participation (in-prison data collection was opportunistic). Participants completed anonymous, pen-and-paper surveys in their living quarters. Participation was voluntary without any form of reward. The research protocol was approved by relevant institutional ethics boards.

2.2. Measures

The data collection was conducted at two time points and two different MCSI scales were used. The U.S. data were collected in 2016 and the revised version of the MCSI was not available until 2017 (Polish and UK data were collected in 2017 and 2018 respectively).

The Measure of Criminal Social Identity (MCSI; Boduszek et al., 2012) was used to assess CSI scores among participants from the USA. The MCSI consists of eight items scored on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores range from 8 to 40, with higher scores indicating higher levels of CSI. The scale is composed of three subscales: cognitive centrality (three items; Cronbach's alpha = 0.69), in-group affect (two items; Cronbach's alpha = 0.71), and in-group ties (three items; Cronbach's alpha = 0.72).

The Measure of Criminal Social Identity – Revised (MCSI-R; Boduszek & Debowska, 2017) was used to assess CSI scores among participants from Poland and the UK. The MCSI-R consists of 18 items scored on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). The scale consists of three subscales: cognitive centrality (six items; Cronbach's alpha = 0.76), in-group affect (six items; Cronbach's alpha = 0.82), and in-group ties (six items; Cronbach's alpha = 0.87). Scores range from 18 to 90, with higher scores indicating higher levels of criminal social identity.

Type of crime was measured by asking the following questions: 'If convicted, what is your index offense? If un-convicted, what is your

alleged offense?’ (i.e., theft, burglary, drugs, violent, sexual, domestic violence, other non-violent, and homicide) and frequency of indicated offenses.

2.3. Data analysis

Descriptive statistics and one-way ANOVAs were calculated in SPSS 25. ANOVAs were performed to determine statistical differences in CSI scores between participants who committed one, two, three, and four and more types of offenses. The analyses were conducted separately for three groups of participants (all U.S. participants, all UK participants, all Polish participants). Effect size was calculated using Cohen’s *d*. Cohen (1988) suggested that *d* = 0.2 be considered a “small” effect size, 0.5 represents a “medium” effect size and 0.8 a “large” effect size.

Next, the network analysis was conducted in stages in JASP version 0.9.2 (JASP, 2019).

Network estimation. A standard network model to use in estimating criminological/psychological networks is the Pairwise Markov Random Field (PMRF; Costantini et al., 2015; Epskamp, Borsboom, & Fried, 2018; Van Borkulo et al., 2014). A PMRF is a network in which nodes represent variables (in this case types of crime and CSI), connected by weighted, undirected edges, which in turn indicate conditional dependence between variables (Epskamp et al., 2018). In this paper, we used both binary (i.e. type of offense) and continuous data (i.e. criminal social identity).

Centrality estimation. Measuring the significance of each node to each network is accomplished by calculating three indices of node centrality: (a) strength, (b) closeness, and (c) betweenness (Van Borkulo et al., 2014). Node strength is a measure of the sum of the weights of the edges (i.e. correlation magnitudes) attached to that node. It is the most important centrality estimate given that high strength nodes indicate the increased likelihood that its activation will be followed by the activation of other nodes. Node closeness denotes the average distance between a given node and the remaining nodes in the network. Node betweenness equals the number of times that a node lies on the shortest path between two other nodes (Opsahl, Agneessens, & Skvoretz, 2010). The importance of nodes with high betweenness estimates relates to their removal from the network; if this were to occur, the distance between other paths would generally increase (Costantini et al., 2015). For all measures of centrality, higher values reflect a node’s greater centrality to the network (McNally, 2016).

Visualization. The nature of an edge is indicated by both colour (blue and red lines represent positive and negative connections, respectively) and thickness (thicker lines represent stronger connections; thinner lines represent weaker connections). Given the cross-sectional nature of the current data, the edges are non-directional, i.e., represent bivariate partial correlations between the variables.

3. Results

3.1. Descriptive statistics and one-way ANOVAs

The number of U.S., UK, and Polish participants who committed

different number (one, two, three, and four and more) and types of crime (theft, burglary, drug-related, violent, sexual, domestic violence, other non-violent, and homicide) is presented in Table 1.

One-way ANOVA results (presented in Table 2) showed statistically significant differences in CSI scores between participants with a record of one, two, three, and four and more types of offenses, among all country samples. Among U.S. participants, those who committed four and more types of offenses scored significantly higher than those who committed one (*d* = 0.49) and two (*d* = 0.45) different offense types. UK participants who committed three types of offenses scored significantly higher than those who committed one (*d* = 1.05) or two (*d* = 1.02) offenses. Among Polish participants, those who committed three as well as four and more types of offenses scored significantly higher than those who committed one (*d* = 0.45, *d* = 0.66 respectively) or two (*d* = 0.33, *d* = 0.54 respectively) types of offenses. In sum, participants who reported having committed a different number of various offense types differed significantly in their CSI scores. These results provide a justification for performing a network analysis to establish which crime types form the strongest links with CSI scores.

3.2. Network analysis

Eight network models were constructed among: (1) U.S. male participants from a maximum security prison, (2) U.S. male participants from a medium security prison, (3) U.S. female participants from a maximum security prison, (4) U.S. female participants from a medium security prison, (5) UK male participants from a high security prison, (6) UK male participants from a medium security prison, (7) Polish male participants from maximum security prisons, and (8) Polish male participants from medium security prisons. All networks were undirected, estimated based on cross-sectional group data. The networks show the strength of relationships between CSI and types of crime variables.

U.S. male participants from a maximum security prison. As demonstrated in the top-left corner of Fig. 1, the strongest positive connections in the network have been found between the “other non-violent offenses” node and nodes representing the following types of crime: drug-related offenses, theft, violent offenses, and burglary. This pattern of connections points to “other non-violent offenses” as the most important node in the network. The analysis revealed one strong negative connection in the network, between homicide and sex offenses nodes. CSI formed positive relationships with other non-violent offenses, theft, drug-related offenses, and violent offenses nodes, as well as a negative relationship with homicide, but all of these were weak. Upon visual inspection of the network, it appears that it forms one community, i.e., there are no distinct, separate clusters of nodes.

Next, Table 3 displays the centrality indices in terms of betweenness, closeness, and strength. “Other non-violent offenses” node recorded the highest values for all three indices. As such, the centrality of this variable to the network has been confirmed. Further, its activation has the strongest influence on other variables in the network. As indicated by the highest betweenness value, the variable acts as the bridge connecting other pairs of nodes.

U.S. male participants from a medium security prison. Visual

Table 1
Number of Prisoners who Committed Different Number and Type of Criminal Acts.

Country	One type of offense	Two types of offenses	Three types of offenses	Four and more types of offenses	Theft	Burglary	Drugs	Violent	Sexual	Domestic violence	Other non-violent	Homicide
USA	506 (65.5%)	155 (20.2%)	69 (8.9%)	42 (5.4%)	184 (25.5%)	160 (22.2%)	200 (27.7%)	227 (29.4%)	116 (15.0%)	19 (2.5%)	62 (8.0%)	195 (25.2%)
Poland	696 (43.7%)	455 (28.6%)	279 (17.5%)	161 (10.2%)	921 (57.9%)	628 (39.5%)	238 (14.9%)	594 (37.3%)	40 (2.5%)	77 (4.8%)	269 (16.9%)	137 (8.6%)
UK	474 (74.3%)	132 (20.7%)	32 (5.0%)	N/A	138 (21.6%)	108 (16.9%)	104 (16.3%)	188 (29.5%)	68 (10.7%)	32 (5.1%)	129 (20.2%)	49 (7.7%)

Note: N/A = data not available. Please note that some of the prisoners committed more than one type of criminal act.

Table 2
ANOVA Results for All Country Samples.

Criminal Social Identity	One type of offense [1] <i>M (SD)</i>	Two types of offenses [2] <i>M (SD)</i>	Three types of offenses [3] <i>M (SD)</i>	Four and more types of offenses [4+] <i>M (SD)</i>	<i>F</i> ratio (<i>p</i> -value)	Significant differences between groups (Cohen's <i>d</i>)
USA	12.67 (4.42)	12.89 (4.43)	13.95 (4.58)	15.17 (5.64)	5.09 (0.002)	1 < 4+ (<i>d</i> = 0.49); 2 < 4+ (<i>d</i> = 0.45)
UK	61.47 (15.98)	64.64 (10.88)	75.97 (11.28)	N/A	14.90 (< 0.001)	1 < 3 (<i>d</i> = 1.05); 2 < 3 (<i>d</i> = 1.02)
Poland	33.68 (12.89)	35.43 (12.45)	39.83 (14.18)	42.80 (14.74)	20.58 (< 0.001)	1 < 3 (<i>d</i> = 0.45); 1 < 4+ (<i>d</i> = 0.66); 2 < 3 (<i>d</i> = 0.33); 2 < 4+ (<i>d</i> = 0.54)

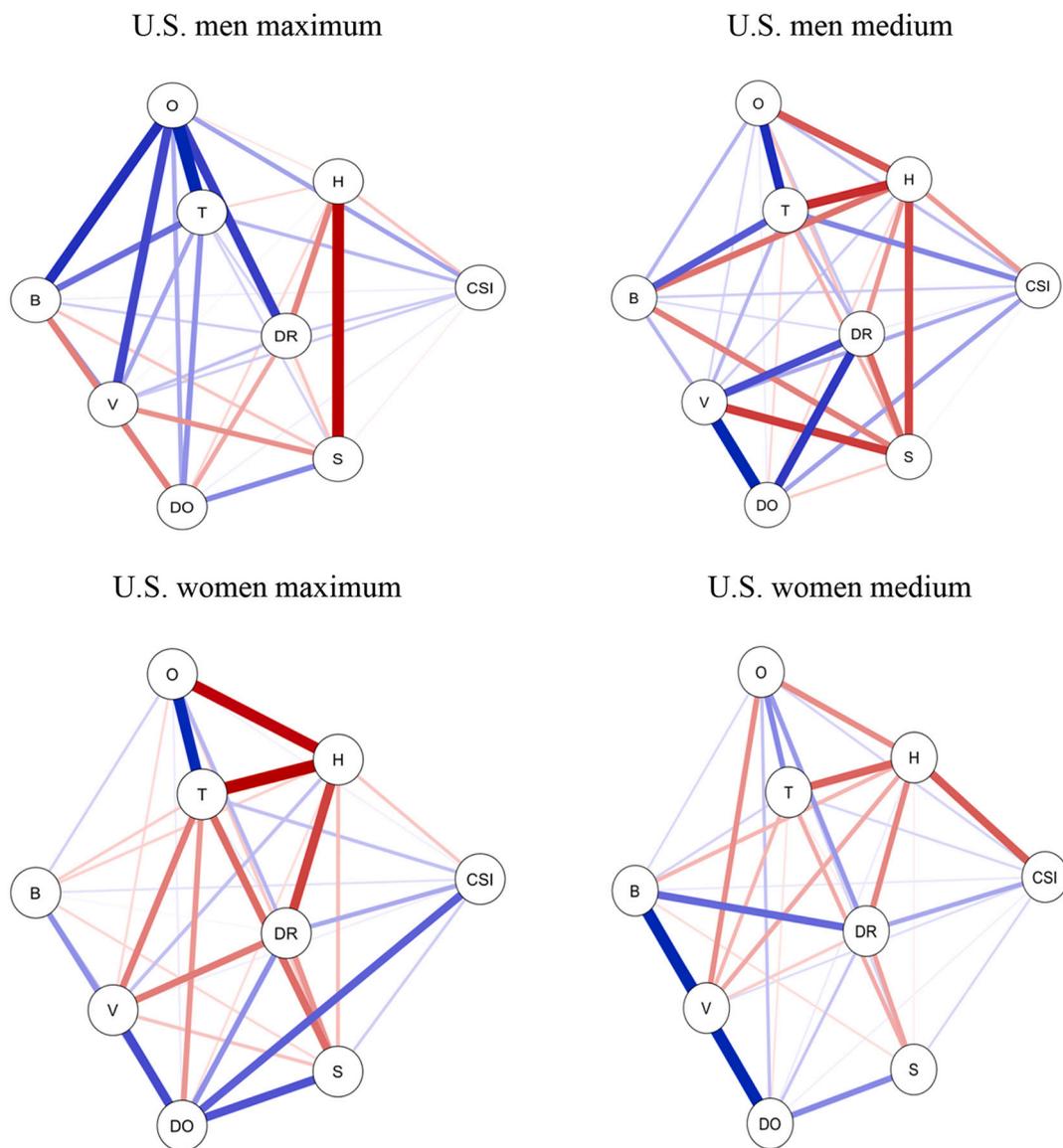


Fig. 1. Estimated network structure of types of offenses and criminal social identity among four samples of U.S. prisoners. Positive edges appear blue, negative red, and stronger and saturated represent strong regularised partial correlations. B = burglary; CSI = criminal social identity; DO = domestic violence; DR = drug-related offenses; H = homicide; O = other non-violent offenses; S = sex offenses; T = theft; V = violent offenses (other than homicide). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

representation of the network is displayed in Fig. 1 (the right-top corner). Forming a triangle, strong positive connections were found between domestic violence, violent offenses, and drug-related offenses nodes. Strong positive connections were also recorded between theft and two other crime nodes: other non-violent offenses and burglary. Strong negative connections were found between homicide and other non-

violent offenses, theft, and sexual offenses. Sexual offenses also correlated in the negative direction with drug-related offenses, violent offenses, and burglary. CSI formed direct connections with six types of crime nodes, but all of these were quite weak. Of the six, the strongest positive connection was between CSI and theft. CSI also formed a negative connection with homicide. The nodes seem grouped into a

Table 3

Centrality Measures for U.S. Samples (Men from a Maximum Security Prison, Men from a Medium Security Prison, Women from a Maximum Security Prison, and Women from a Medium Security Prison).

Variable	Men maximum			Men medium			Women maximum			Women medium		
	Betweenness	Closeness	Strength	Betweenness	Closeness	Strength	Betweenness	Closeness	Strength	Betweenness	Closeness	Strength
CSI	-0.77	-1.69	-1.66	-0.99	-0.91	-1.68	-0.59	-1.17	-1.27	-1.19	-1.58	-1.47
B	-0.44	0.22	0.18	-0.99	-0.59	-0.73	-0.59	-1.84	-1.61	1.07	0.52	1.18
DO	-0.11	-0.46	-0.17	-0.55	-0.92	-0.52	1.96	1.14	0.82	-0.06	-0.37	0.56
DR	0.22	0.75	-0.08	-0.10	-0.04	0.06	-0.36	0.60	0.02	0.50	1.41	0.34
H	-0.11	-0.51	-0.75	1.69	1.93	1.32	-0.13	-2.21	1.06	1.07	0.88	1.02
O	2.52	1.92	2.05	-0.99	-1.02	-0.74	-0.59	-0.53	-0.13	-1.19	-0.04	-0.02
S	-0.11	-0.56	-0.09	1.25	0.99	0.37	-0.59	0.43	-0.13	-1.19	-1.19	-1.55
T	-0.77	0.26	0.62	0.35	0.18	1.02	1.49	0.92	1.37	-0.06	-0.44	-0.54
V	-0.44	0.06	-0.08	0.35	0.38	0.91	-0.59	0.45	-0.12	1.07	0.82	0.47

Note. B = burglary; CSI = criminal social identity; DO = domestic violence; DR = drug related offenses; H = homicide; O = other non-violent offenses; S = sex offenses; T = theft; V = violent offenses (other than homicide).

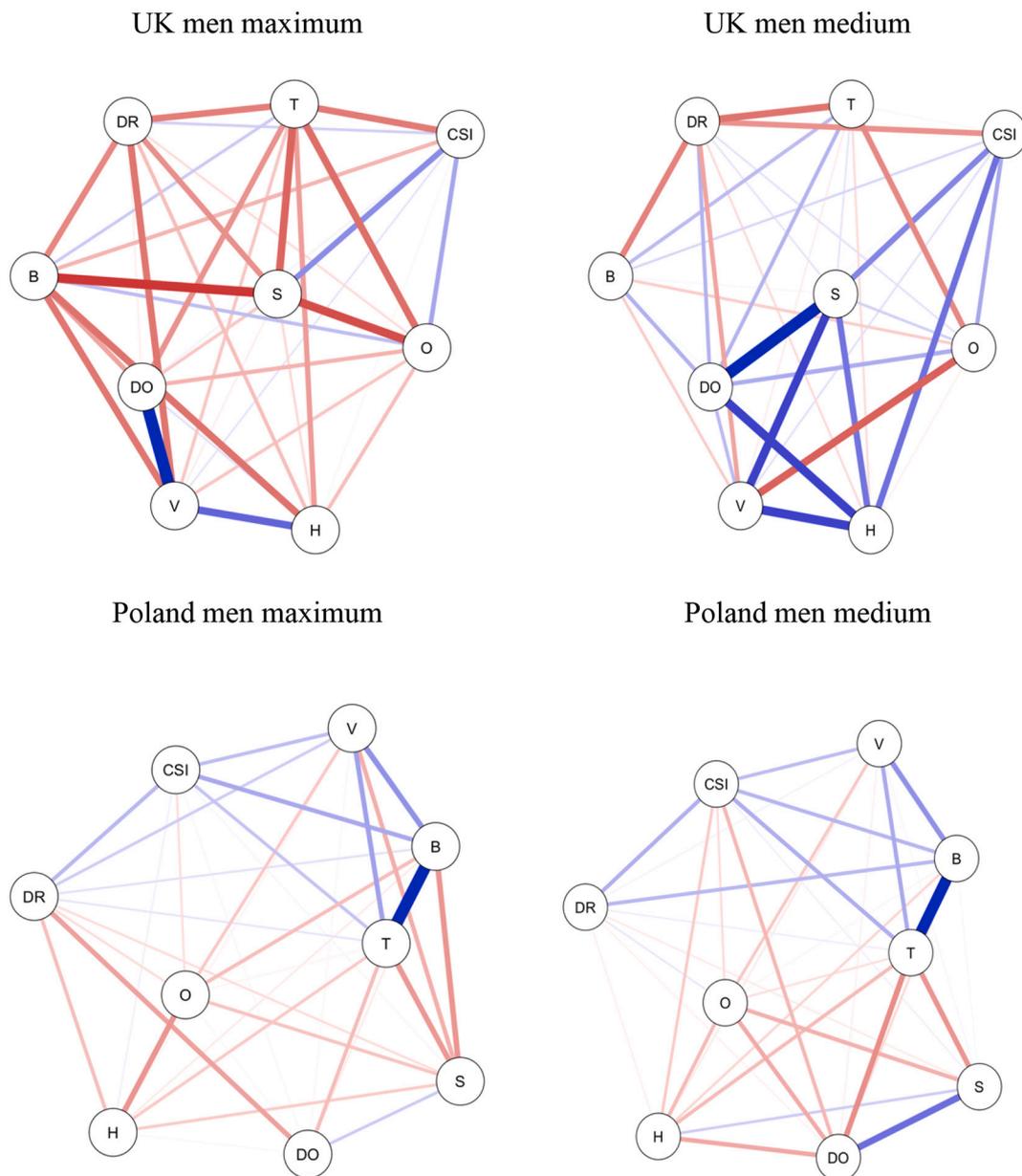


Fig. 2. Estimated network structure of types of offenses and criminal social identity among Polish and UK prisoners. Positive edges appear blue, negative red, and stronger and saturated represent strong regularised partial correlations. B = burglary; CSI = criminal social identity; DO = domestic violence; DR = drug-related offenses; H = homicide; O = other non-violent offenses; S = sex offenses; T = theft; V = violent offenses (other than homicide). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

single cluster, suggesting a single community. In addition, Table 3 reveals the highest betweenness, closeness, and strength values for the homicide node. Although all six connections that homicide formed are negative, it is a crucial node to the whole network.

U.S. female participants from a maximum security prison. The visual representation of the network is displayed in the bottom-left corner of Fig. 1. Overall, the network seems to represent a single community of nodes. The strongest positive connections are reported between other non-violent offenses and theft; as well as between domestic violence and violent offenses, sex offenses, and CSI nodes. Although CSI formed direct connections with six nodes, only the one with domestic violence was strong. Next, homicide formed strong negative connections with other non-violence offenses, theft, and drug-related offenses. Table 3 indicates that the highest betweenness and closeness values were recorded for domestic violence, pointing to the node's key role in the network's connections. The highest strength value was recorded for theft.

U.S. female participants from a medium security prison. Displayed in the bottom-right corner of Fig. 1 is the visual representation of the network for U.S. female participants from medium security prisons. The strongest positive connections were between violent offenses and burglary as well as domestic violence. The connection between burglary and drug-related offenses was also quite strong. Homicide formed quite strong negative connections with theft and CSI. The seven remaining connections recorded for CSI and types of crime nodes were weak or very weak. Table 3 reveals that the highest betweenness values was recorded for three different nodes: burglary, homicide, and violent offenses. The highest closeness value was found for drug-related offenses, whereas the highest strength value for domestic violence. Of all the networks estimated for U.S. samples, this one had the fewest strong connections (both positive and negative).

UK male participants from a maximum security prison. The visual representation of this network is displayed in Fig. 2. Of all networks presented here, this one has the largest number of negative connections. The nodes representing violent offenses, burglary, homicide, drug-related offenses, theft, sexual offenses, and other non-violent offenses were all negatively interconnected. The strongest positive connection was found between domestic violence and violent offenses. CSI formed six relatively weak connections with crime type nodes. The strongest of the six were positive connections with sexual offenses and other non-violent crimes, and a negative connection with theft.

Values for betweenness, closeness, and strength indices were the highest for the theft node (see Table 4). Upon visual inspection, it appears that the network formed a single community of nodes.

UK male participants from a medium security prison. This network is displayed in the top-right corner of Fig. 2. The strongest positive connections were reported for the following variables: violent offenses with homicide and sex offenses, homicide with domestic violence, and domestic violence with sex offenses. The strongest negative relationship was between violent offenses and other non-violent

offenses. Of the six CSI connections, the strongest were with drug-related offenses (negative), sex offenses (positive), and homicide (positive). The network appears to form a single community of nodes. In addition, as displayed in Table 4, the highest betweenness values were found for domestic violence, drug-related offenses, and violent offenses nodes. The highest closeness and strength values, in turn, were reported for domestic violence.

Polish male participants from maximum security prisons. The visual representation of this network can be found in the bottom-left corner of Fig. 2. Of all networks in this paper, the two networks among Polish male participants from both maximum and medium security prisons are characterized by the weakest connections between nodes. In this network, the only strong connection (positive) was between burglary and theft. All connections between CSI and crime type nodes were weak or very weak. Theft recorded the highest values on betweenness, closeness, and strength indices (see Table 5). The network appears to have formed a single community of nodes.

Polish male participants from medium security prisons. This final network is displayed in the bottom-right corner of Fig. 2. As in the other network among Polish prisoners, the only strong positive connection was found between burglary and theft. All connections between CSI and crime type nodes were weak or very weak. Overall, the two networks estimated for Polish participants are very similar in terms of the connections formed between nodes. As indicated in Table 5, burglary recorded the highest values for betweenness, closeness, and strength indices.

4. Discussion

We used network analytic approaches to explore a new research question as to how criminal social identity (CSI) associates with different types of crime (theft, burglary, drug-related, violent, sexual, domestic violence, other non-violent, and homicide). Justification for utilizing the novel statistical approach came from ANOVA results, which demonstrated significant differences in CSI scores between prisoners who committed different numbers of various offense types. Therefore, we estimated eight networks among prisoners from the U.S., UK, and Poland to establish which crime types tend to form the strongest links with CSI. Our results reveal varying pathways between CSI scores and crime types for the different samples, but certain commonalities have also been identified. Below, findings are discussed separately for different countries and genders.

4.1. U.S. male prisoners

First, we found that the structure of pathways between CSI and crime types in the networks constructed among U.S. male prisoners from medium and maximum security prisons were similar, but stronger interconnectivity between CSI and crime types was found for men from a medium security prison. This may be because mobility in medium

Table 4
Centrality measures for UK samples (Men from a Maximum Security Prison and Men from a Medium Security Prison).

Variable	Men maximum			Men medium		
	Betweenness	Closeness	Strength	Betweenness	Closeness	Strength
CSI	-0.86	-1.62	-1.65	-1.11	0.17	-0.76
B	0.10	1.22	1.06	-1.11	-2.01	-1.52
DO	0.59	-0.31	-0.59	1.24	1.14	1.16
DR	-0.86	-0.11	-0.45	1.24	-0.04	-0.03
H	-0.86	-0.61	-0.95	-0.52	0.47	0.62
O	-0.86	-0.72	-0.20	-0.52	-0.23	-0.41
S	0.10	1.08	0.91	0.06	0.62	1.04
T	2.06	1.28	1.10	-0.52	-1.05	-1.07
V	0.59	-0.19	0.76	1.24	0.92	0.97

Note. B = burglary; CSI = criminal social identity; DO = domestic violence; DR = drug related offenses; H = homicide; O = other non-violent offenses; S = sex offenses; T = theft; V = violent offenses (other than homicide).

Table 5

Centrality measures for Polish samples (Men from Maximum Security Prisons and Men from Medium Security Prisons).

Variable	Men maximum			Men medium		
	Betweenness	Closeness	Strength	Betweenness	Closeness	Strength
CSI	-0.43	-0.56	-0.71	0.25	-0.07	-0.01
B	1.80	1.64	1.62	0.25	0.99	0.81
DO	-0.43	-0.95	-1.27	1.24	0.88	0.68
DR	0.68	-0.73	-0.30	-0.73	-1.47	-1.45
H	-0.43	-0.85	-0.77	-0.73	-0.68	-0.43
O	-0.43	-0.64	-0.51	-0.73	-0.91	-0.54
S	-0.99	0.41	0.34	-0.73	0.11	-0.30
T	1.24	1.47	1.46	1.90	1.59	1.92
V	-0.99	0.22	0.14	-0.73	-0.44	-0.66

Note. B = burglary; CSI = criminal social identity; DO = domestic violence; DR = drug related offenses; H = homicide; O = other non-violent offenses; S = sex offenses; T = theft; V = violent offenses (other than homicide).

security prisons is less restricted and hence prisoners have more opportunities to communicate and socialize with one another. Both the pattern of connections presented in the graph as well as centrality indices revealed other non-violent offenses node as the most important node in the network for prisoners from the maximum security prison. This node formed a positive association with CSI, and this was also the strongest association recorded between CSI and the crime type nodes. Other non-violent offenses node emerged as a possible bridge node between CSI and four other crime types, including burglary, theft, drug-related offenses, and violent offenses. Among men from a medium security prison, CSI formed the strongest positive association with the theft node, which, in turn, appears to be a possible bridge offense between CSI and burglary as well as other non-violence offenses.

Prior research demonstrated that those serving a sentence for an acquisitive crime are likely to re-offend (Brunton-Smith & Hopkins, 2013), which, we theorized, may be intensified by high CSI scores. The present finding that offenses that are typically committed with accomplices are mostly associated with CSI are in support of this supposition and our initial prediction. U.S. prison professionals may wish to focus predominantly on acquisitive crime histories and co-offending when designing interventions aimed at building more prosocial identities.

As hypothesized, both networks revealed negative associations between CSI and homicide. Having formed numerous strong, negative associations with other nodes, homicide was the most important node in the medium security prison network. All in all, it can be suggested that in the U.S., individuals convicted of homicide are not characterized by a strong criminal identity and hence do not need interventions which focus on decreasing CSI.

4.2. U.S. female prisoners

Among women from a maximum security prison, CSI formed the strongest, positive association with the domestic violence node. Domestic violence, in turn, formed strong, positive correlations with sex and violent offenses, creating a bridge between the two crime type nodes and CSI. These data suggest that women with increased CSI scores commit different forms of interpersonal violence, both inside and outside their intimate relationships. This is an interesting finding; however, given the limited literature on relationship violence among women, difficult to unravel. It may be that women develop violent cognitions and behaviors when socializing with criminal peers and/or antisocial family members, which later serve as enablers of interpersonal and relationship violence. Alternatively or additionally, it may be that women are more likely to be convicted of domestic violence only if the violence was particularly severe or if they have also committed violence outside the home, with other domestic violence by women remaining a hidden and unreported crime (e.g. Archer, 2000; Straus, 1999).

The pathways between CSI and crime types were somewhat different among women from a medium security prison. Specifically, CSI formed

a positive but not very strong association with drug-related offenses. Drug-related offenses, in turn, correlated with burglary, violent offenses, and domestic violence.

Since CSI in women seems to be more strongly associated with violent forms of crime, it appears that for women social learning in criminal groups centers around violence. Although this finding needs to be explored in future research, one possible explanation is that women who are surrounded by criminal others become violent to ensure respect and self-preservation (Batchelor, 2005). Alternatively, women with violent histories form bonds with similar others because they are stigmatized and ostracized by the mainstream society for having committed crimes which are stereotypically male offenses. Women who are violent, and especially those who are violent toward their family members, are thought to have betrayed their womanhood and are therefore guilty of "double deviance" (Pollack, 1950; Saulters-Tubbs, 1993). This latter explanation is further supported by the finding that the associations between CSI and violent crime types were the strongest in maximum security prisons, i.e., institutions occupied by prisoners with more violent and serious backgrounds who are more likely to have been criminally involved and also to be rejected by society (Gaes & Camp, 2009). When targeting CSI and criminal cognitions, professionals may wish to focus on women incarcerated for violent offenses other than homicide. A special focus should be placed on perpetrators of domestic violence, who may be more vulnerable to creating bonds with other prisoners to compensate for lost bonds with significant others and for whom, our data suggest, an assumption that their problems are entirely about relationships might be too narrow.

4.3. UK male prisoners

CSI formed stronger and more positive associations with crime type nodes among prisoners from a medium compared with a maximum security prison. A similar finding was reported for the U.S. male prisoners. In both UK networks, CSI associated positively with sex offenses and other non-violent offenses. The UK was the only jurisdiction in which CSI associated with sexual offending. In addition, among inmates from medium security prisons, sex offenses node appeared to serve as a bridge between CSI and domestic violence and violent offenses.

Similarly to violent women, men convicted of sexual offending are socially stigmatized by the mainstream society and face family ostracism (Tewksbury, 2005). Although stigmatized individuals can respond by correcting the characteristic that spawns their stigma or surpass the stigma by excelling at something else, this is hard to achieve successfully. Most men in this situation have to sign on a sex offender registry and when incarcerated are more likely to feel helpless, thinking that their exclusion from the society cannot be reversed (Goffman, 1963; Tewksbury, 2005). They are not wrong: after release, many find themselves barely surviving rather than thriving (Milner, 2016). Such individuals, however, are not exempt from the human need to create social bonds. In the absence of prosocial others, they can conclude their only

option is to form bonds with others also convicted of sexual offending, potentially increasing the chances of recidivism. Prisons which participated in the current study have separate blocks for sexual offenders, which gives them an opportunity to create social bonds with one another. Although physical safety offered by such arrangements is of paramount importance, prison professionals must consider and address the collateral consequences of locating people with sexual convictions together in prisons (Mann, 2016; McNaughton Nicholls & Webster, 2018). Furthermore, to reduce recidivism, it is advisable that men convicted of sexual offenses are also assessed for CSI. Currently, specialist programs tend to focus on specific cognitions associated with sexual offending, sexual interests, and social functioning. While these are all important risk factors (Mann, Hanson, & Thornton, 2010), and many prisoners with these convictions are “sexual specialists”, there are also a substantial proportion who are criminally versatile (Howard, Barnett, & Mann, 2014). We expect that it is this versatile group who display high levels of CSI and as such, focusing entirely on risk factors for sexual offending may well miss some key criminal identity issues.

Contrary to our initial predictions and to what was found among U.S. participants, homicide node formed a relatively strong positive association with CSI among UK participants from medium security prisons. Although this cannot be examined using the current data set, this result could have been affected by over-representation of gang members who committed homicide in the current sample. This supposition seems to be supported by the positive connections that homicide node also formed with other crime types typically committed by gangs (such as violent and drug-related offenses) (National Gang Center, 2013). However, we cannot verify this due to the lack of data pertaining to participants’ gang activity. To test this possibility, further research is needed in UK prison samples.

4.4. Polish male prisoners

Pattern of pathways between CSI and crime type nodes were similar across the medium and maximum security Polish samples. However, the overall network interconnectivity among both samples was rather weak. CSI associated positively with violent offenses, burglary, theft, and drug related offenses, though all of those associations were quite weak. The strongest of the four was the association between CSI and burglary among medium security prisoners. This finding is in support of our initial prediction that acquisitive crime, which frequently involves accomplices, would be positively associated with criminal identity (National Audit Office, 2007; Weerman, 2003).

4.5. Limitations

Several limitations of the current study should be taken into consideration. First, all data were collected using a self-report survey and self-report measures are prone to bias (e.g., social desirability, demand characteristics). Second, the analyses were based on cross-sectional data so the causal chains between CSI and crime types could not be studied. It is recommended that future research re-assesses participants’ CSI levels at regular intervals and monitors their re-offending history. Third, we only had one female sample from the U.S. and although the analysis revealed some interesting findings, we do not yet have sufficient studies to be confident in our understanding of CSI among women. To expand our understanding of CSI among women who offend and to allow for cross-country comparisons, future research should focus on recruiting female prisoners. Finally, criminal identity was measured with the MCSI among the U.S. samples, whereas the remaining samples completed the MCSI-R, which limits our ability to compare the results across the samples. Additionally, it is worth to mention that the variation in prison experience (e.g., sentence length, prison security) may influence the variance in CSI within each sample included in the current study.

5. Conclusions

To our knowledge, the current study is the first study to examine the relationship between CSI and crime categories from three different countries (USA, UK, and Poland) and prison security levels (medium and maximum) by using the network framework. In sum, our results reveal varying pathways between CSI scores and crime types for the different samples. CSI formed stronger associations (both positive and negative) with crime type nodes among U.S. and UK prisoners than among Polish prisoners.

There were also some differences in network pathways for prisoners incarcerated in medium and maximum security prisons from the same country, but those disparities were not considerable and were related predominantly to the strength of associations between CSI and crime type nodes. This latter finding indicates that similar targeting strategies can be used for rehabilitative approaches addressing CSI across prison types situated in similar cultural contexts.

Our prediction that CSI would form positive links with acquisitive crime types was partially supported among U.S. and Polish male prisoners. Homicide formed negative associations with CSI among male prisoners from the U.S. and Poland as well as U.S. female prisoners. U.S. female prisoners and UK male prisoners who face social stigmatization (such as domestic violence and sex offenders) seemed to have developed stronger CSI. We have speculated on the possible reasons for this, and we hope that the present study will set directions for and facilitate hypothesis forming in future similar investigations.

Practically, these findings can be used by prison professionals to better target rehabilitative programs addressing criminal identity as a risk factor for re-offending. This is particularly important in light of limited prison service resources and funding cuts. Some crime types, such as women who have committed domestic violence and men who have committed sexual offenses, may not typically be thought of as having criminal identities. Our data suggest that assessment of CSI as a risk factor for recidivism should be given greater focus with these individuals.

Declaration of Competing Interest

None.

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