Reward systems in prison

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3 Prior Studies on the Effects of Reward Systems in Prison■

3.1 Introduction

Reward systems are commonly used in prisons worldwide to influence the behaviour and attitudes of incarcerated individuals. Reward systems in prison (RSPs) apply the technique of awarding rewards contingent on display of 'good' behaviour and removing rewards following misconduct (Burdon et al. 2003). RSPs do not use any other type of punishment. Good behaviour (e.g., hygiene maintenance, participation in work or activities) in prison has long been rewarded with sentence discounting (Demleitner, 2017; Hyneman, 1927; Weisburd & Chayet, 1989) and incremental degrees of freedom and privileges (e.g., Gillin, 1930; Hamels, 1996; Maconochie, 1846). Today, rewards are used to manage and change behaviour in prison (units) in Canada (Serin & Hanby, 2009) and the United States (Michigan Department of Corrections, 2020; Mitchell, 2010; The Guardian, 2019) and in the entire prison systems of England and Wales (Liebling, 2008), Romania (Morar et al., 2019), the Netherlands (Dutch Custodial Institutions Agency (DJI), 2013), and Ireland (Irish Prison Service, n.d.). Considering tens of thousands of offenders are sentenced to prison in these countries each year, these reward systems potentially impact the behaviour and attitudes of many incarcerated individuals.

RSPs can be an attractive management tool for encouraging compliance, for the benefit of order and safety in prison. It is believed by rewarding individuals with, for example, extra opportunities for visitation or recreation motivates them to behave well (see also the section 'Rationale of Contingency Management Systems' below). Additionally, it sends the message that resources are only spent on individuals who have earned it, which can be considered politically persuasive. Indeed, this take on treating incarcerated individuals is in line with the current trend of responsabilisation. This neoliberal governance strategy refers to transposing responsibilities of rehabilitation and reform from the government to incarcerated individuals (Garland, 1996; 2001; Hannah-Moffat, 2005; Shammas, 2014).

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Surprisingly, very little is known on RSP effectiveness in terms of change in incarcerated individuals' behaviour and attitudes, since published reviews of the empirical literature on this topic are nearly absent (Burdon et al., 2003; McGuire, 2018). The only exception – known to the authors – concerns a meta-analysis by Gendreau et al. (2014). These authors examined the effectiveness of one type of RSPs: Token economies. These systems reward good behaviour with tokens, which can be exchanged for social, material, and active rewards (e.g., extra visits, cigarettes, and access to the gym). Their findings suggest that Token economies can successfully change behaviour of incarcerated individuals in 69 percent of cases. However, the included studies do not provide insight into the effectiveness of RSPs in which people are not allowed to select their own rewards, nor distinguishes effects between RSPs targeting different behaviours and populations. This could be essential, as prior empirical research on reward effectiveness has shown that being able to select rewards which are attractive to an individual can moderate RSP effectiveness in terms of behavioural and attitudinal change (Lee et al., 2010; Premack, 1965; Sulzer-Azaroff & Mayer, 1991). Other variables presumably affecting the effectiveness of systematic rewarding are system monitoring, choice of target behaviour (Kazdin, 2001; Sulzer-Azaroff & Mayer, 1991) and target population; as participants must possess sufficient (cognitive) capacities to be able to change and regulate their behaviour and be responsive to rewards (Andrews & Bonta, 2010; Kazdin, 1982; Schunk & Zimmerman, 2012; Sulzer-Azaroff & Mayer, 1991).

Of course, numerous reviews on the effectiveness of interventions on behaviour and attitudes of incarcerated individuals have been conducted (for a non-exhaustive overview, see Lipsey & Cullen, 2007), yet they do not provide insight into RSP effectiveness. Unfortunately, many of these overarching reviews do not differentiate between reward and punishment techniques in discussing intervention effectiveness (Andrews et al., 1990; French & Gendreau, 1996; Garret, 1985; Keyes, 1996; Koehler et al., 2012; Landenberger & Lipsey, 2005; Lipsey et al., 2007; Morgan & Flora, 2002; Pearson et al., 2006; Wilson et al., 2005). Be that as it may, offender rehabilitation experts pose that rewards are more effective in changing behaviour than punishments (Gendreau et al., 2014), in line with empirical research on this topic (Azrin & Holz, 1966; Marlowe & Kirby, 1999). Some of these reviews do not differentiate between criminal justice settings either (e.g., Lipsey et al., 2007; Pearson et al., 2006). However, empirical prison research suggests that institution-level factors, such as social prison climate, quality of staff-incarcerated individual relationships and security level, can mediate rule compliance (Bosma et al., 2020a; Huebner, 2003; Pappas & Dent, 2021; Steiner & Woolredge, 2008), suggesting that prior empirical findings, such as among drug court participants and probationers, might not translate well to the unique prison setting. Furthermore, reviews mostly examined effectiveness in terms of recidivism post-release, but not behavioural and/or attitudinal change in prison. Those that do, report inconclusive outcomes (French & Gendreau, 1996) or small reductions in prison misconduct (Keyes,

1996), and a considerable advancement in a range of psychosocial outcomes (e.g., self-esteem) (Morgan & Flora, 2002).

The lack of an overview of empirical knowledge on reward systems in prison and the lack of consensus on its effects can be explained by the fact that this strand of research has primarily focused on non-incarcerated offenders, specifically substance abusers, probationers, and parolees. This body of research has indicated that (removal of) rewards (often money vouchers or prizes; Petry, 2000) can stimulate therapy engagement, reduce substance related offences (Burdon et al., 2003; Petry, 2000) and promote abstinence in substance abusers (Ainscough et al., 2017; Davis et al., 2016; Griffith et al., 2000; Lussier et al., 2006; Prendergast et al., 2005). Effect sizes were found to be moderated by reward volume and immediacy of application (Lussier et al., 2006). In probation and parole, rewards are most used to increase parole-meeting attendance and reduce recidivism. However, an extensive meta-analysis has shown their effectiveness on these two outcome measures to be ambiguous (Prendergast et al., 2015). At best, recidivism seems to be delayed using rewards in post-prison supervision (Sloas et al., 2019). At the intersection of prison and community are sentence discounting programmes (e.g., good or earned time credit). The available research suggests that granting or removing good time, has no or even negative effects on both misconduct in prison and recidivism post-release (Emshoff & Davidson, 1987; Johnson & Stageberg, 2014; Steiner & Cain, 2014; 2019). The extent to which these specific findings among non-incarcerated offenders can be transposed to those in prison, is unclear.

Therefore, in this paper we aim to create more insight in the effectiveness of RSPs, by addressing the following research question: What is known about the effects of reward systems in prison on the behaviour and attitudes of incarcerated individuals? To answer this research question, we conduct a systematic review of the international empirical literature on this topic. With this review, we aim to identify the available knowledge on the effectiveness of reward systems in prison, assess its methodological quality, and identify helpful new avenues for empirical research in this field.

An overview on RSP effectiveness is both theoretically and practically relevant. RSPs are assumed to yield positive effects on behaviour. Scholars have even hypothesised that encouraging incarcerated individuals to earn rewards with good behaviour can promote their self-rehabilitation through reinforcing prosocial behaviour, and by offering motivated individuals extra education and training (Gendreau et al., 2014). In contrast, other scholars argue that rehabilitation in prison can be frustrated by making access to known promotors of behavioural change dependent on their behaviour, such as qualitative social relationships in prison (Craig, 2004), access to visitation (Hutton, 2017) and other activities evidenced to promote rehabilitation (Prison Reform Trust, n.d.). An overview of the empirical studies on this topic can provide data to assess these hypotheses.

Additionally, the aim of this systematic review is to generate actionable knowledge for policymakers in the criminal justice system and profession-

als working in prisons. Providing an oversight of RSP effectiveness can aid criminal justice policy decision-making and professionals working in prisons to implement and operate reward systems effectively. In answering our research question, we discuss the target populations, target behaviours, and techniques of the three types of studies on RSPs which emerged from our findings. Before focusing on the effects of reward systems in prison (RSPs) on behaviour and attitudes, we briefly discuss the mechanisms behind possible effects of these systems. In other words, we discuss the theoretical framework that is commonly assumed to underpin RSPs.

3.1.1 Rationale of Contingency Management Systems

The assumption that systematic rewarding influences the behaviour of incarcerated individuals can be traced back to contingency management systems, of which RSPs are one example. Contingency management systems are based on the principles of operant or instrumental conditioning, which underpin classical behaviour therapy (Skinner, 1938). Operant conditioning principles are used in many areas of life, such as pet training, classroom management, and work productivity. Its core assumptions are that behaviour is determined by anticipation of its consequences and that the cause of behaviour lies in environmental stimuli instead of in the actor himself (Ayllon & Milan, 1979). Pleasant consequences of behaviour are believed to increase the likelihood of its recurrence and unpleasant consequences its extinction (Azrin & Holz, 1966; Skinner, 1938). According to the principle of extinction, removing reinforcement will generally cause the performance of previously rewarded behaviour to fade out (Vurbic & Bouton, 2014). Following this theoretical perspective, rewards may serve as incentives of compliance in prison, up to the point of release and thus removal of reinforcement. The behaviours which contingency management aims to increase, are referred to as target behaviours.

Four types of rewards and punishments can be distinguished: positive and negative reinforcement,[1] and positive and negative punishment. The labels 'positive' and 'negative' are not morally laden, but simply refer to functions. Positive reinforcement translates to adding something positive

1 Throughout time and disciplines, scholars and policymakers have used several terms to describe positive reinforcement, such as rewards (Howard League for Penal Reform, 2018), privileges (Chantraine, 2006), reinforcements (Milan, 1971; Glimmerveen et al., 2018), credit (Burchard, 1967; Morar et al., 2019; Durnescu & Poledna, 2020) and incentives (Liebling et al., 1999; Irish Prison Service, n.d.). In this paper, we will refer to rewards to describe stimuli that are thought to increase the likelihood of future behaviour occurring (Miller, 2006), as we find this lay-term more accessible than 'reinforcement', less normative than 'privilege', more general than 'credit' – which indicates a specific form of reward –, yet more specific than 'incentive', which can refer to any type of stimulus.

contingent on performing a desirable behaviour (e.g., rewarding hygiene maintenance with extra meals), whereas negative reinforcement refers to removing something unpleasant (e.g., unlocking the cell between activities). The goal of reinforcement is to reinforce the behaviour performed. The behaviours which reward systems aims to increase, are referred to as target behaviours. Positive punishment translates to adding an aversive consequence after performing an undesirable behaviour (e.g., isolation following an incident), whereas negative punishment refers to removing a reinforcer (e.g., removing visitation privileges following an incident). Negative punishment is also referred to as response cost (Kazdin, 1972). The goal of punishment is to decrease the behaviour performed. Systems which use operant conditioning principles to influence behaviour are often referred to as contingency management systems. They can use a selection of all four types of rewards and punishments. However, reward systems in prison exclusively use positive reinforcement (reward awarding) and negative punishment (reward removal). Several techniques for reward application can be used, such as the use of tokens or points which can be exchanged for rewards, pre-selected sets of rewards that are provided upon level progression, and the use of contingency contracts in which mutually agreed upon target behaviours and rewards are described, upfront.

RSPs thus rely heavily on extrinsic motivation as a driver of positive behaviour, but this may be at the cost of intrinsic motivation to change. Previous research found that external regulation of behaviour and extrinsic rewards (e.g., in a school context) may undermine intrinsic motivation (Deci, Koestner & Ryan, 1999). Given the popularity of RSPs, the lack of a clear evidence base, and potentially adverse and undesirable effects, research on the application and effectiveness of RSPs is timely and necessary.

3.2 Methods

The main goal of this study was to assess the effects of RSPs on the behaviour and attitudes of incarcerated individuals. Therefore, we conducted a systematic review following these recommended steps: identification, screening, eligibility, and inclusion (Higgins & Green, 2021; Petticrew & Roberts, 2008). The entire screening process is visually captured in the PRISMA flowchart (see Figure 3.1) (Moher et al., 2009).

3.2.1 Identification of Possibly Relevant Publications

First, we searched for relevant publications in several academic research databases. Given the topic of this study and our research question, we chose to identify relevant records by searching scientific databases Web of Science (1945-present), PsychInfo (1967-present), Criminal Justice Abstracts

(1968-present), ProQuest and Google Scholar. Web of Science (which hosts a collection of databases, e.g., MEDLINE and ScIELO) was selected as it is the world's leading multidisciplinary scientific search tool. PsychInfo complements this database as it has been found to include studies on psychological and psychiatric topics that are not available in other databases, such as MEDLINE (e.g., Brettle & Long, 2001; Stevinson & Lawlor, 2004). To avoid publication bias, Criminal Justice Abstracts (which includes dissertations, government reports, books, and unpublished papers), ProQuest Dissertations and Theses, and Google Scholar were also searched. No temporal search limits were set. The entire search was conducted in March 2021. We conducted the literature search with specific inclusion criteria – and thus search terms – that were based on the central research question.[2] Therefore, publications were only considered relevant if these described a study in which (a) the reward system was applied in a prison or jail, (b) the reward system involved providing and/or removing rewards, (c) the rewards were provided based on an assessment of a defined target behaviour, (d) the effects / outcomes discussed were attributed to the RSP and (e) rewards were at least partially enjoyed in prison. Study quality was not an inclusion criterion, as we aimed to map all relevant research on this topic and assess its methodological quality. Additionally, to further minimise publication bias, we snowballed through references of the included studies and important retrieved literature reviews and meta-analyses on contingency management systems in incarcerated populations (e.g., Gendreau et al., 2014; Serin & Hanby, 2009). Snowballing did not reveal additional unique records. These search strategies combined resulted in 2972 records. After removal of 557 duplicates, 2415 unique records were identified.

3.2.2 Screening Title and Abstract

Second, each of the 2415 unique publications was screened by title or abstract and selected when relevant. The aim of screening was to exclude publications that did not meet the inclusion criteria. As a result, reward systems in other settings than prisons or jails, such as forensic hospitals, reformatory schools, problem-solving courts, parole, and probation, were excluded. Studies on remission systems, good and earned time credit, and early release programmes were also excluded. This also applied to RSPs

2 Based on the research question and inclusion criteria, we conducted a search with the following search terms: ("contingency management" OR "response cost*" OR "positiv* reinforc*" OR "negativ* reinforc*" OR incentiv* OR privileg* OR reward* OR "operant* condition*" OR "radical behav*" OR "behav* modif*") AND ("correctional institution*" OR "correctional facilit*" OR penitentiar* OR *prison* OR jail* OR incarc*). We inserted a 'NOT' command to exclude irrelevant topics: NOT ("prisoner dilemma*" OR "prisoners dilemma*" OR "prisoner's dilemma*" OR "prisoners' dilemma*").

that only use positive punishment, and RSPs introduced as part of a non-contingent multimodal treatment programme. Yet, RSPs in which engaging in such programmes was a specific target behaviour and thus rewarded, were included. The screening of all unique 2415 publications, resulted in 334 potentially relevant studies, of which 79 full texts were not located. The remaining number of 255 studies is substantial, as we chose to screen full texts when in slightest doubt of relevance. And doubt there often was, because titles and abstracts often contained terms such as 'behaviour modification', 'reinforcement' or 'incentive', whereas those labels did not reveal whether it concerned reward (removal) or other forms of reinforcement and/or punishment. Although labour-intensive, this approach was chosen to circumvent unfortunate exclusion of relevant studies.

3.2.3 Screening Full-texts

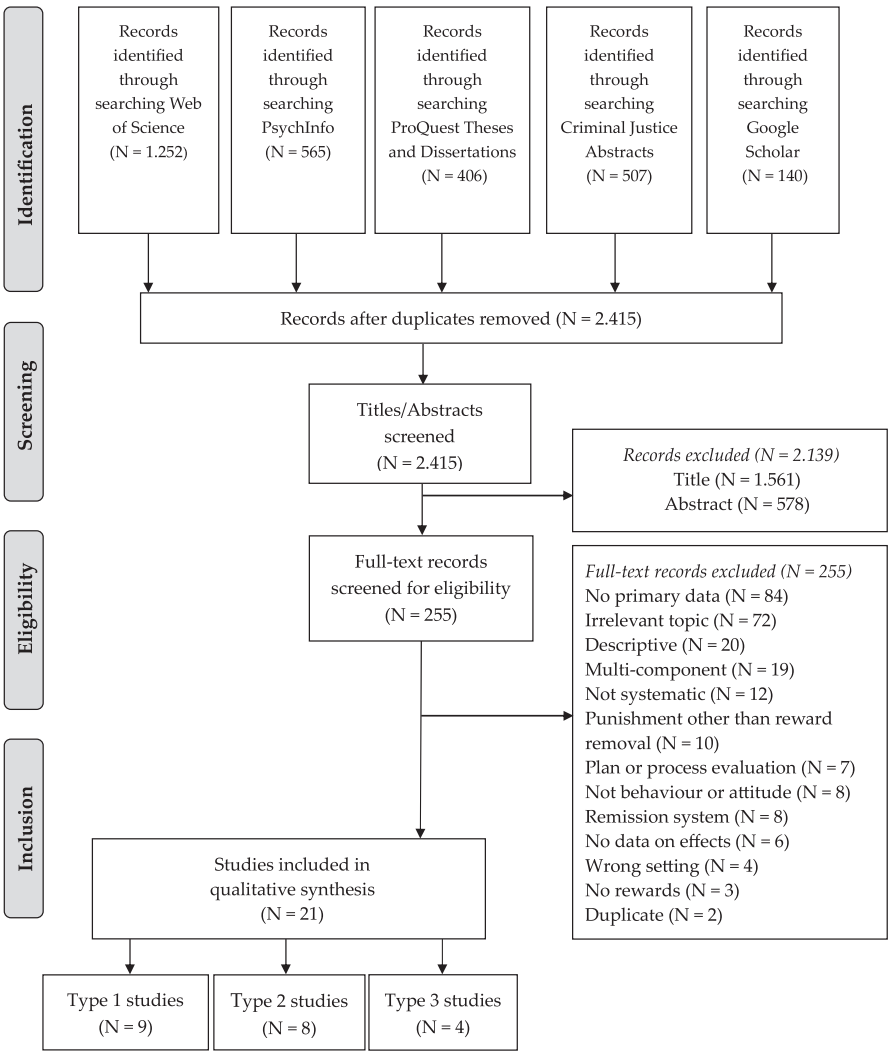
Third, the full texts of the remaining 255 studies were read, and publications were excluded when they did not meet the inclusion criteria. Again, the same inclusion criteria were used as in the first and second step. Note that quantitative studies, mixed-methods, and qualitative studies were included. Inclusion of qualitative studies in systematic reviews is not common in criminology (Azjenstadt, 2016). However, doing so was relevant to our research question, as qualitative insights could potentially be helpful for understanding effects found in quantitative studies (Seers, 2015) and identifying side effects. The screening of the full texts of 255 studies resulted in a selection of 21 relevant studies. Two of those studies were reported in one publication (Milan et al., 1979b). Two separate publications reported results from the same sample (Khan 2016, 2020). Most full-texts were excluded for reasons of not containing primary data, full-texts not being available or being irrelevant upon further inquiry (see Figure 3.1).

3.2.4 Synthesis

Finally, all 21 studies that met the inclusion criteria were synthesised, focusing on study outcomes and quality. Synthesis involved a critical appraisal of the results. For this purpose, we extracted data from the studies. For quantitative studies, a data extraction form was prepared with key meta-data (e.g., sample characteristics, setting, reward types, reported effects, etc.), which was analysed for patterns. The same method was used for qualitative studies, except that the results consisted of themes that were described and discussed by the author. No additional content analysis of these studies was conducted to see if other themes would emerge. When reading the selected 21 studies, a pattern emerged in the sense that three types of studies could be distinguished, and we classified each study into one of these types. The three distinct types of studies on RSPs are: (1) quantitative studies con-

ducted before 1993, (2) quantitative studies conducted after the year 2000 and (3) qualitative studies conducted after the year 2000.[3] After reading all 21 studies carefully, we classified 9 studies as type 1, 8 as type 2 and 4 as type 3. Note that the three types of studies do not only differ according to their publication date or whether these are qualitative or quantitative, but more importantly in context, sample size, dominant research method, research design and technique, as well as immediacy of reward application (see our discussion below and table 3.1).

Figure 3.1
PRISMA Flowchart



3.2.5 Quality Assessment

The Maryland Scientific Method Scale (SMS) (Cook & Campbell, 1979) was used to assess study quality of quantitative studies, which is commonly used in criminology (Farrington et al., 2002; Petticrew & Roberts, 2008). This scale is a five-point scale ranging from 1 (cross-sectional correlations) to 5 (randomised-controlled trials). Six studies were scored as 1, as these cross-sectional studies lacked control groups. We scored the quality of seven studies as 2, among which were ABA-designs, which included before-after comparisons, but lacked counterfactuals and randomised participant selection. Three studies were scored 3, as they included before-after comparisons and control groups, but important unobserved differences were likely to exist between these groups. One quasi-experimental study (before-after comparison, matched (but not randomised) control group, use of control variables) was scored 4. That no randomised-controlled trials were found is in line with previous findings indicating the scarce use of this golden standard to study intervention outcomes in prisons (e.g., Lipsey & Cullen, 2007; Beaudry et al., 2021). Thus, overall study quality of quantitative studies was low to medium in terms of SMS-scores. However, this does not necessarily mean these studies do not contribute to our understanding of reward systems in prison. On the contrary, cross-sectional study outcomes can be valid when the exposure to the intervention can be assumed to be stable over time (Kesmodel, 2018), which can be argued to be the case for these prison-based studies. Although hard to draw robust conclusions on causality based on low- to medium-score studies, they did present valuable information on correlations between systematic rewarding and behavioural or attitudinal outcomes.

For assessing quality of qualitative studies, we used the Critical Appraisal Skills Programme (CASP) checklist for qualitative research (Critical Appraisal Skills Programme, 2018). The CASP is a commonly used tool for study quality appraisal, supported by the Cochrane Qualitative and Implementation Methods Group (Long et al., 2020) and contains questions which are included in most study-quality appraisal tools (Munthe-Kaas et al., 2019). This checklist contains ten review questions (e.g., 'was the research design appropriate to address the aims of the research?'), which have to be answered with 'yes', 'can't tell' or 'no'. A common difficulty in the use of CASP is how to distinguish between genuine research flaws and lack of reporting (Long et al., 2020). Fortunately, this issue was easily overcome, as all the included qualitative studies were part of larger dissertational research projects, all of which provided additional information relevant for assessing individual study quality. Another issue of using CASP is how to arrive at overall quality judgements; determining which or how many no's indicate poor quality (Long et al., 2020). As most questions for most of the included qualitative studies were answered affirmatively, and no's did not relate to any fatal flaws (Dixon-Woods et al., 2004) or essential elements (Carroll et al., 2012) – such as rigor of data collection or appropriateness of using a qualitative methodology – we concluded that all four studies were of good quality.

3.3 Results

3.3.1 Characteristics of Studies on RSP Effectiveness

As discussed above, our systematic literature review resulted in 21 studies, and three types of studies were distinguished (Appendix B lists all study key characteristics). Nine studies were categorised as type 1: quantitative studies conducted before 1993, eight studies were categorised as type 2: quantitative studies conducted after the year 2000, and four studies were categorised as type 3: qualitative studies conducted after the year 2000.[3]

The three types of studies clearly differed in their study characteristics (see Table 3.1). Type-1 studies were characterised by (i) exclusively being conducted in the US, (ii) with relatively small sample sizes, (iii) using quantitative research methods. More importantly, however, all studies concerned experimental token economies, in which rewards were provided immediately following good behaviour. Six of these studies were conducted in a special experimental unit in Draper correctional centre in Elmore Alabama, in the 1960s. Rewards were awarded immediately upon display of target behaviour. Four out of nine studies were included in a prior meta-analysis (Gendreau et al., 2014). Apart from the RSP in one study (Ellis, 1993), all systems were developed, implemented, and monitored by external researchers. All type-1 studies monitored and tracked behaviour of single subjects.

Type-2 studies were characterised by (i) being conducted in various countries (predominantly United States (US) and United Kingdom (UK)), (ii) with relatively large sample sizes, (iii) using quantitative research methods, (iv) to study non-experimental RSPs, (v) which use non-immediate rewarding. In contrast with most type-1 studies, type-2 studies mostly included participants who did not volunteer for system participation. Moreover, two out of eight systems in these studies were developed, implemented, and monitored by external researchers. The remaining six studies were conducted by prison administrations. Three out of eight systems in these studies involved points or tokens. Time between display of target behaviours and receiving rewards was usually less immediate than in the type-1 studies, as this period ranged from 1-7 days (Feinstein, 2000), 14-28 days (Liebling, 2008, see Ministry of Justice, 2011), 14-120 days (Reid et al., 2000), 30 days (Sharma & Marino, 2017), 30-60 days (Meyers et al., 2018) to 30-90 days (Meyers et al., 2020). All type-2 studies monitored and reported on behavioural change of single groups. None of the type-2 studies were included in a prior meta-analysis (Gendreau et al., 2014).

Type-3 studies were characterised by (a) being exclusively conducted in the UK, (ii) with relatively small sample sizes, (iii) qualitative research methods, (iv) non-experimental RSPs and (v) non-immediate rewarding.

3 No qualitative studies dating before 1993 were found. Therefore, this type of study is not distinguished.

The findings of these four recent studies (2011-2020) were all based on either semi-structured interviews, in-depth interviews, or extensive ethnographic research, in UK prisons where the Incentives and Earned Privileges (IEP) scheme was in place. None of the type-3 studies were included in a prior meta-analysis (Gendreau et al., 2014).

Table 3.1
Characteristics of three types of RSP studies

Characteristics	Type 1	Type 2	Type 3
Study			
Number of studies	9	8	4
Publication date	Pre or in 1993	Post 2000	Post 2000
Context	US	US, UK, Romania	UK
Sample size	Range = 2 – 56	Range = 10 – 4960	Range = 16-72
Methodology	Quantitative	Quantitative, mixed,	Qualitative
Participation	Part voluntary, part imposed	Imposed	Imposed
System			
Design	Experimental	Non-experimental	Non-experimental
System	One-levelled token economies	One-levelled token economies, multiple level progression-dependent reward systems	Three-level progression-dependent reward systems
Immediacy of rewards	Immediately following target behaviour(s)	1-120 days following target behaviour(s) and/or attitudes	14-28 days following target behaviour(s) and/or attitudes

3.3.2 Effectiveness of RSPs

Effects are discussed per study type, by focusing on target populations, target behaviours and attitudes, and techniques (including reward types), as empirical research building upon the operant-conditioning framework suggests that these variables can moderate RSP effectiveness (Andrews & Bonta, 2010; Kazdin, 1982; 2001; Premack, 1965; Schunk & Zimmerman, 2012; Sulzer-Azaroff & Mayer, 1991).

3.3.3 Type-1 Studies

All but one type-1 study (McKee, 1971) researched a token economy, which is why we do not differentiate between the effectiveness of different techniques here (e.g., contracts, systems using pre-selected sets of rewards awarded upon level progression).

A review of these type-1 studies on the effects of token economies (N = 8) indicated that, overall, these RSPs were effective in improving academic achievement (e.g., language skills), and personal hygiene and cellblock maintenance, through immediately rewarding with tokens exchangeable for a range of reward types.

The synthesis of these studies also showed that the effects of these studies did not differ according to the type of target population. The effects of RSPs on individual academic achievement and performance of daily-living activities were found to be predominantly positive in volunteers who cognitively functioned below average (IQ 80-89). Positive effects on these outcome measures were found for seven out of nine studies, six of which included cognitively below average functioning (M IQ = 88.3) men aged 17-35 years who volunteered for experiment participation (Kandel et al., 1976; McKee, 1971; 1972; Milan & McKee, 1976; Milan et al., 1979a, study 1 & 2; Milan et al., 1979b), and one included adolescent girls (aged 11 to 15) with learning difficulties (Rice, 1970). Three studies reported that positive effects quickly declined to baseline level after the token economy had been terminated (Milan & McKee, 1976; Milan et al., 1979a, study 1). Notably, the sample of four studies, containing adult men, was identical (Milan & McKee, 1976; Milan et al., 1979a, study 1 & 2). There was no indication from these studies that personal characteristics (e.g., age, gender, ethnicity, sentence length) influenced the effects found. However, apart from cognitive functioning, these studies did not report data on risk, need or responsivity of the participants.

Furthermore, the synthesis of type-1 studies also showed that the effects of the RSPs did not differ according to target behaviours and attitudes. Positive findings related to target behaviours focused on academic achievement (Kandel et al., 1976; McKee, 1972; 1971; Milan et al., 1979b; Rice, 1970), maintenance of personal and area hygiene (Milan & McKee, 1976), violent behaviour (Ellis, 1993), rule compliance (Milan et al., 1979a, study 1), and time watching news (Milan et al., 1979a, study 2). Behavioural change in type-1 studies was measured either through observations (e.g., news watching), incidents reported, or number of academic tests passed. Type of measurement did not appear to affect RSP effectiveness. As it was possible to exchange tokens for a wide range of reward types (e.g., material, social, internal freedom) in the RSPs reported on in these studies, and the frequency with which reward types were selected by participants was not documented, it was impossible to distinguish the effect of reward type on RSP effectiveness. Reward types were unknown in one study (McKee, 1971).

3.3.4 Type-2 Studies

A review of the type-2 studies (N = 8) showed that the effectiveness of the examined RSPs differed considerably. These recent quantitative studies indicated that RSPs can be effective in advancing mental health among

mentally ill participants, decreasing violent behaviour among high-risk participants, increasing academic achievement, and reducing problem behaviour among adolescents and young adults. The RSPs did not appear to be effective in decreasing misconduct – both during and post imprisonment – in heterogenous populations, nor in promoting engagement in substance-use treatment among incarcerated men and women with substance use problems.

The synthesis of these studies also showed that RSP effects differed according to target population type. Although it is difficult to draw robust conclusions, effects generally were more positive for smaller and specific target populations, compared to larger and more heterogeneous groups of participants. This is illustrated by the fact that lower-quality studies on RSPs in female adolescents (aged 14 to 18) and young adults (aged 18 to 21) (in both minimum-security and maximum-security settings) (Feinstein, 2003; Sharma & Marino, 2017) and high-risk men in a restrictive housing unit (Reid et al., 2000) reported positive effects on participants' behavioural change. There were, however, three exceptions, reported in studies with somewhat higher study quality. Another study on high-risk men in restrictive housing reported mixed outcomes: no change in mental health, but a considerable decrease in antisocial behaviour lasting over twelve months after RSP termination (Meyers et al., 2018). In contrast, a study on individuals with a serious mental illness found significant positive effects of RSP on mental health, but negative effects on minor violations (e.g., maintaining personal hygiene, littering, smoking) (Meyers et al., 2020). Although no clear explanation for these findings was provided, the authors did note that minor violations increased leading up to RSP participation and gradually decreased during RSP participation. Effects in this study were less favourable for both participants at higher risk of suicide or self-harm and participants refusing to partake in programmed activities more than once. Furthermore, a study among incarcerated individuals with substance use problems reported no significant change in treatment engagement and psychosocial functioning (Burdon et al., 2013). RSPs implemented in entire prison systems, and thus in heterogenous populations, illustrated less favourable results overall (Liebling, 2008; Morar et al., 2019). Moreover, effects reported in one of these studies were even more negative for compliant, at-risk-of-suicide, older and more educated individuals in the UK system (Liebling, 2008). Based on three studies including both male and female participants (Burdon et al., 2013; Liebling, 2008; Morar et al., 2019), there is no indication that effects were gender specific.

Furthermore, synthesis also showed that the effects of the RSPs studied differed according to target behaviours and attitudes. Generally, target behaviours aimed at cognitive change, particularly dynamic criminogenic needs, were associated with increased RSP effectiveness. Specifically, seven studies included target behaviours aimed at cognitive change, of which five exclusively (Feinstein, 2003; Reid et al., 2000; Sharma & Marino, 2017) or predominantly (Meyers et al., 2020; 2018) reported positive outcomes.

These, cognitive programmes focused on changing dynamic criminogenic needs: criminogenic cognitions, school and work, and substance use (Andrews et al., 2006). Programmes included participation in cognitive restructuring programmes aimed at changing antisocial thinking, attitudes, behaviour and choices, dealing with problems and conflict resolution (Sharma & Marino, 2017), self-reflective self-study programmes, cognitive-behavioural group therapies, and need-oriented individual counselling (Meyers et al., 2020; 2018), anger management and positive peer culture (Feinstein, 2003), as well as a range of group cognitive and mental health programmes addressing thinking errors, self-esteem and moral reasoning (Reid et al., 2000). However, one study included cognitive-behavioural therapy, but found contradictory results on measures of criminal thinking and psychosocial functioning, and non-significant results on substance use treatment engagement, compared to a control group (Burdon et al., 2013). It was unclear to which degree one of the RSPs included programmes targeting cognitive change (Morar et al., 2019).

Finally, the synthesis of these studies illustrated that the effects of type-2 studies slightly differed according to technique. Studies show somewhat more favourable behavioural outcomes for RSPs in which pre-selected rewards were awarded upon level progression (which in some cases took up to more than days), compared to the use of exchangeable tokens – which, in contrast, allow for personal selection of rewards, directly after completing a target behaviour. Two studies reporting on token economies did not find significant effects on post-release recidivism and psychosocial functioning (Burdon et al., 2013; Morar et al., 2019), whereas a prior study on an RSP among incarcerated adolescents did find a decrease in problem behaviours (Feinstein, 2003). However, both outcome measures and measurement instruments differed considerably among these studies. Out of five studies using pre-selected rewards in level systems, three found merely positive results (Meyers et al., 2018; Reid et al., 2000; Sharma & Marino, 2017), one study reported mixed outcomes (Meyers et al., 2020) and another study found negative effects on behavioural outcomes (Liebling, 2008). The time between display of target behaviour and reward reception did not seem to have an impact on RSP effectiveness, even though this time varied considerably between studies. In general, there were no indications that RSP effectiveness was impacted by selection of reward type. However, RSPs in which internal freedoms (transfer to general population (in restrictive housing), time out of cell, freedom to move around the unit or facility) were used as rewards, reported more favourable outcomes regarding behavioural change compared to those that did not (Meyers et al., 2018; Reid et al., 2000; Sharma & Marino, 2017), yet not exclusively (Burdon et al., 2013).

3.3.5 Type-3 Studies

Overall, type-3 studies (N = 4) indicated that RSP effectiveness can be

affected by (perceptions of) programme elements and implementation factors. The scope of these studies was wider than the study of RSP effects yet contained relevant data on RSP effects. Type-3 studies were not synthesised by target population, target behaviours and technique, not least because they all concern participants in the UK's three-levelled IEP scheme. Instead, we describe the most prominent themes emerging from these studies, which can influence RSP effectiveness: the pain of self-government, perceived legitimacy, and family-contact rewards.

The synthesis of type-3 studies showed that RSP effectiveness can be moderated by the pain of self-government. Three studies, using semi-structured interviews (Khan, 2016; 2020) and extensive ethnographic research (Crewe, 2009; 2011), reported that the pain of self-government can frustrate RSP effectiveness. This psychological burden was described as resulting from being held accountable for one's behaviour (Crewe, 2011b), while one's agency is simultaneously constrained (Khan, 2022). This led participants to feel constantly 'on edge', as they were held 'responsible for an increasing range of decisions' and experienced 'less freedom to be left alone and move through the system passively' (Crewe, 2011b, p. 518-519). This pain can frustrate RSP effectiveness either because individuals lack adequate self-regulatory skills to cope with this burden and display target behaviours, because it may trigger resistance, or both. Both incapability and demotivation to display target behaviours has been documented in studies throughout the last decade, indicating that RSP responsivity is a persistent factor (e.g., Crewe, 2011b; Khan, 2022).

Furthermore, synthesis of these studies indicated that perceived legitimacy could affect RSP effectiveness. Participants in two studies (Crewe, 2011b; Khan, 2016) reported that RSPs impacted their behavioural choices more positively when they felt that rewards and behavioural assessments were applied legitimately (i.e., neutral, and respectful). These findings were in line with Liebling's (2008) questionnaire-based outcomes. Khan (2016) found that participants at higher system levels perceived the system as more legitimate, compared to those at lower levels. Additionally, participants who felt that they were treated respectfully by staff, chose to display target behaviours more often (Khan, 2022). In contrast, participants reporting little perceived legitimacy, also experienced decreased psychological well-being, demonstrated by feelings of powerlessness (Khan, 2016; 2022), anxiety and helplessness (Crewe, 2011b). Contributing to a feeling of powerlessness, particularly among introvert and passively complying participants, was the experience that prison officers often failed to notice and monitor performed target behaviours (Khan, 2022). Being required to 'actively' (i.e., visibly) engage in prosocial behaviour may have decreased progression opportunities for those individuals whose compliant behaviour went unnoticed, which in turn demotivated them to display target behaviours (Khan, 2022). Hence, both perceptions of system application and outcomes (i.e., rewards) appear to influence RSP effectiveness, through altering extrinsic motivation levels.

Finally, synthesis of these qualitative studies highlighted that using family contact as a reward can positively influence RSP effectiveness, whilst simultaneously creating resistance. All studies (Booth, 2020; Crewe, 2011b; Khan, 2016; 2020) reported that using family contact as a reward (i.e., additional visits, telephone credit; British Ministry of Justice, 2013) had an overall positive effect on incarcerated individuals' display of target behaviours, even though they generally perceived this as highly unfair. Interviews with incarcerated mothers illustrated that mother-child contact is an important social need, which serves as an important motivator for RSP compliance (Booth, 2020). The RSP was experienced as a barrier to fulfil this social need when mothers were unable to maintain contact due to a lack of telephone credit (a reward tied into level progression). Yet, contact with children was also experienced as a source of motivation for system compliance among incarcerated fathers – that is, for those attributing value to social contact (Khan, 2022). In essence, these qualitative findings not only illustrate that the attractivity of rewards is personal and subjective, but also that behavioural change can be increased by using attractive rewards. However, rationing what matters most may also create resistance and perhaps inflict upon perceptions of legitimacy.

In summary, studies on experimental token economies conducted in the 1960s-1970s found positive effects on academic achievement and hygiene maintenance, in target populations cognitively functioning below average (IQ 80-89), although statistical significance of these findings is unclear (type-1 studies). Contemporary, non-experimental RSPs yielded positive behavioural outcomes when targeting high-risk participants, including cognitive-programme engagement as target behaviours, and using pre-selected sets of rewards awarded upon level progression. RSPs applied in large, heterogenous target populations were generally less effective (type-2 studies). Qualitative studies indicated that several implementation factors can influence system compliance and behavioural change among participants, such as the pain of self-government, perceived legitimacy, and using family contact as a reward. Severity of impact depends on participant characteristics and perceptions of system application (type-3 studies).

3.4 Conclusion and discussion

Until now, criminological literature lacked an oversight of the effectiveness of reward systems in prison (RSPs). Therefore, this systematic review set out to answer the research question: What is known about the effects of reward systems in prison (RSPs) on the behaviour and attitudes of incarcerated individuals? Twenty-one studies met the inclusion criteria, which could be categorised in three distinct types: type-1 studies concerned 20th-century research on experimental token economies, type-2 studies were contemporary, non-experimental, and quantitative, and type-3 studies were qualitative and UK-based. It stands out that while RSPs are widely implemented,

the quality and quantity of recent and relevant research lags behind. Still, we can build on the synthesis of findings from each of these categories of studies.

The synthesis of type-1 studies (N = 9) illustrated that experimental token economies improved academic achievement and hygiene maintenance in target populations cognitively functioning below average. This finding is in line with the results from a meta-analysis on correctional token economies using punishments and rewards, in which five of these studies were included (Gendreau et al., 2014). However, the internal validity of these studies is questionable. However, the internal validity of these studies is questionable. The ABA designs (having non-contingency periods between token interventions) of most of these studies may have consolidated learning (Gendreau et al., 2014). Moreover, four of these studies were conducted on the same participants, facilitating testing effects. Furthermore, voluntary RSP participation may indicate a relatively high motivation baseline, which is generally associated with offender-treatment completion (Andrews & Bonta, 2010) and, in turn, behavioural change (Olver et al., 2011). Lastly, one third of the studies reported that positive effects deteriorated after experiment termination, indicating that token economies are suitable for managing behaviour in prison but are not associated with lasting change. This corroborates findings of meta-analyses on contingency management application in non-incarcerated individuals with substance use problems (Benishek et al., 2014; Sayegh, et al., 2017). A common explanation for short-lived effects of behavioural interventions is that rewarding prosocial behaviour does not unlearn antisocial behaviour (Crossley et al., 2013), nor instils intrinsic motivation to do so.

The synthesis of type-2 studies (N = 8) indicated that contemporary, non-experimental RSPs reported positive behavioural outcomes when targeting high-risk participants, including cognitive programmes as target behaviours, and using pre-selected sets of rewards awarded contingent on level progression. RSPs applied in large, heterogenous target populations were generally less effective. RSPs including cognitive programme elements adhered to multiple RNR-principles, such as addressing dynamic criminogenic needs (e.g., antisocial cognition and substance abuse) through cognitive-behavioural treatment (CBT) (e.g., Thinking for a change) (Andrews et al., 2011; Bonta & Andrews, 2007). Research on the cumulative effect of reward application and contingent CBT engagement of incarcerated individuals is scarce, and available evidence is mixed (Bahr et al., 2012; Carroll et al., 2012). More importantly, effects might differ for systems paired with cognitive change programmes, compared to systems in which engagement in such programmes is part of an RSP and thus rewarded. The conclusion that RSPs applied in heterogenous prison populations, using universal rewards, produce heterogenous effects (e.g., Liebling, 2008), could partially be explained by the subjective valuation of reward types (Booth, 2020; Kazdin, 1982; Khan, 2016; 2020). That is, some individuals may care for (some) rewards, others may not. Lastly, somewhat more support was

found for systems that use sets of rewards awarded upon level progression, compared to Token economies. This is surprising, as prior research indicated that the attractiveness (Kazdin, 1982; Sulzer-Azarhoff & Mayer, 1991) and immediacy of receiving rewards can moderate system success, due to reward discounting and poor impulse control, which characterise incarcerated populations (Arantes et al., 2013; Hanoch et al., 2013; Meijers et al., 2015). However, in systems that use sets of rewards, participants could not choose their rewards (which ensures rewards are sufficiently attractive) and often had to wait much longer before receiving rewards (up to 120 days), compared to token techniques.

The synthesis of type-3 studies (N = 4) indicated that several design and implementation factors can influence system compliance and behavioural change among participants, such as the pain of self-government, perceived legitimacy, and using family contact as a reward. While it was previously argued elsewhere that system design deliverance can influence contingency management system outcomes (Gendreau & Listwan, 2018), these specific factors, derived from qualitative research, have not been related to RSP effectiveness before. First, being held accountable for a wide range of behaviours, but being uncapable or unwilling to act responsibly, was found to frustrate system effectiveness. Qualitative studies described that an RSP can decrease psychosocial functioning of participants by over asking their self-regulatory capacities (Crewe, 2011b). Individuals with an intellectual disability in prison may be especially prone to over asking, due to cognitive, social, practical, and conceptual impairments (American Psychological Association (APA), 2013). This potentially unresponsive subpopulation might be substantial, as intellectual disabilities are very common in (UK) prisons (Ali et al., 2016; Hassiotis et al., 2011; Murphy et al., 2017). We do not suggest that these individuals are unresponsive to reward systems in general, but rather to general reward systems. In fact, a long line of empirical research on motivation in students with intellectual disabilities suggests that this population is indeed highly responsive to extrinsic rewards (Katz & Cohen, 2014). However, there is a lack of empirical research on incarcerated individuals with intellectual disabilities. Second, decreased perceived legitimacy was found to decrease participants' well-being, worsen staff- incarcerated individual relations, and subvert system success of the UK's Incentives and Earned Privileges scheme (e.g., Crewe, 2011b; Khan, 2016; 2022; also see Liebling, 2008). Respondents expressed feeling being punished twice when arbitrarily denied rewards; an experience which according to experimental studies can indeed deteriorate relationships between staff members and incarcerated individuals and reduce perceptions of legitimacy (Azrin & Holz, 1966; Brunton-Smith & McCarthy, 2016). In turn, poor relationships with staff could have further frustrated their progress, because maintaining good relationships with staff was also a target behaviour (British Ministry of Justice, 2013). Even seminal works such as Pentonville (Morris & Morris, 1963) and Society of Captives (Sykes, 1958) already recognised that staff- incarcerated individual relationships can have an instrumental function (both for staff

and incarcerated individuals), and order and compliance are often carefully negotiated between incarcerated individuals and prison officers. Third, using family contact as a reward has been found to be effective for those individuals attributing high value to family contact. This is not surprising, as (incarcerated) individuals are motivated best by what they value most (Premack, 1965). Conditionalizing such basic need fulfilment also instilled resistance in this subpopulation. This is understandable, as social connectedness and autonomous decision-making are theorised to be important basic human needs (Ryan & Deci, 2000b) – or 'primary goods' in criminological terms (Good Lives Model (GLM) of rehabilitation, Ward & Gannon, 2006). However, the degree to which basic human-need fulfilment in prison should be behaviour-based is a question on normativity rather than effectiveness, and an issue easily overlooked by criminal justice policymakers implementing behavioural interventions such as RSPs (Liebling, 2001).

3.4.1 Limitations

This study also has several limitations, mostly related to generalisability of findings of studies on RSPs. First, the included studies were predominantly conducted in the UK and US, and often dated back decades. Geographical clustering makes it difficult to generalise findings to other contexts, because, next to obvious differences in prison management and characteristics between countries, institution-level factors (e.g., social prison climate, quality of staff- incarcerated individual relationships) often differ between correctional settings, yet are also found to influence rule compliance behind bars (Bosma et al., 2020a; Huebner, 2003; Pappas & Dent, 2021; Steiner & Woolredge, 2008). Geographical clustering may have been prompted by the exclusive use of English search terms – which may also have resulted in exclusion of relevant studies published in other languages. Additionally, as type-1 studies are temporally clustered in the 1970s, it is questionable to what degree their findings can legitimately be used to understand effectiveness of contemporary RSPs. Prisons have changed drastically over the last 50 years. Next to specific contemporary challenges (e.g., overcrowding, gang membership, drug use, psychosocial problems), offender treatment in prison has intensified and is increasingly directed at individual risks and needs (Woolredge & Smith, 2018). Consequentially, it is hard to generalise some of these findings over place and time.

There are also limitations to our ability to draw causal inferences related to methodological issues and study quality. Overall study quality of quantitative studies (type 1 and 2) was low in terms of SMS-scores. Poor quality ratings were mainly due to little use of control groups, checks for alternative explanations and an overall lack of randomised treatment. Effects were thus often measured as change over time in one sample. It is unclear to what extent the effects reported were caused by the RSP; perhaps behavioural change would have occurred regardless of systematic rewarding or was

caused by alternative variables. As such, it is hard to pinpoint the working mechanisms of RSPs. Reported effects should therefore be interpreted with caution. However, higher, and lower quality studies do not necessarily systematically differ in effect size and direction (Garrett, 1985; Pearson et al., 2006). Moreover, four type-1 studies used the same sample of volunteers, which may have overemphasised the positive effects of this study type, not least because of possible learning and testing effects, and high baseline motivation levels. It is also important to note that effects in type-1 and type-2 studies were often measured by display of target behaviours. Due to this (narrow) focus, possible side effects may have been overlooked, such as alterations in prison climate and self-regulatory capacities. Based on these findings, the rehabilitative value of RSPs is questionable, because studies often use outcome measures unrelated to criminogenic needs. This, again, raises the question to what extent display of good behaviour behind bars is associated with the gradual process of psychological, moral, and social rehabilitation (McNeill, 2012). On the upside, the exposed lack of high-quality empirical research can spur future empirical research on this topic and clarify the evidence base of this intervention to policymakers and practitioners.

3.4.2 Implications for Theory, Policy, and Practice

This review's findings have several implications for theory, future policy and practice, and research. Mixed findings highlighted in this review might relate to a lack of adequate theory on systematic reward application in prison settings (Ward, 2019). Although operant conditioning principles are described extensively (Murphy & Lupfer, 2014), little theory is developed on how certain target behaviours and rewards are ought to motivate incarcerated individuals to change their behaviour. The dominant model of offender rehabilitation (RNR) does not provide any specific answers either, other than referring to operant conditioning principles (Andrews et al., 1990; Bourgon & Bonta, 2014) and general strain theories (Andrews et al., 2011). The RNR model appears to lack a clear conception of how extrinsic and intrinsic motivation relate to offender behavioural change (Andrews et al., 2011). Fortunately, the RNR model is open to 'being informed by psychological models of motivation' (Andrews et al., 2011, p. 739). A next step would be to develop and test theories on RSPs, both in relation to prison-based and rehabilitative outcomes.

The poor methodological quality of many studies also points to the obvious implication of conducting rigorous evaluations of RSPs, especially considering the stakes involved. Indeed, some scholars have pointed out the problems of making programming and visitation (partly) conditional on good behaviour (Craig, 2004; Hutton, 2017). Future research should therefore seek to build a strong evidence base on RSPs to inform policymaking and prison management.

At present, the evidence appears to suggest that rewards and target behaviours should be individualised and reflect participants' cognitive and other self-regulatory capacities (Bonta & Andrews, 2010; Ziv, 2017), and include most attractive rewards. The number of target behaviours should be small enough to be comprehensible by the individual (Marlowe, 2006). Target behaviours should be formulated in a measurable manner, but should also be specific and simple, because complex wording may frustrate participants (Crewe, 2011b; Liebling, 2008) – especially those with impaired cognitive functioning (Gonçalves et al., 2014). Additionally, prison officers are advised to differentiate between those who are unwilling and those who are unable to take responsibility. Disappointing outcomes should not be instantly attributed to a participant failing to take responsibility. Rather, it should be examined to what degree the RSP components suit the target group, and whether the programme theory needs revising (Liebling, 2008). Simple system alterations have been found to drastically alter the outcomes of contingency management interventions (see Kazdin, 1982).

This review of RSP effectiveness provides new insights, but also raises multiple new questions. First, future research could adopt search terms in multiple languages, as well as a variety of wordings, to retrieve as many relevant qualitative and quantitative studies on RSPs as possible. Second, the attractiveness of different reward types in different target groups could be further explored on group level, to increase participant responsivity. This could be done both qualitatively and quantitatively, as is previously done in prison populations (Goddard & Gendreau, 1992) and other target groups (Glimmerveen et al., 2018). Third, interaction effects of RSP and activities directed at cognitive change could be further explored. Increased insight in the interrelations of behavioural and cognitive change may help select effective target behaviours, suitable for decreasing prison misconduct, recidivism or other policy aims. Fourth, quantitively exploring the moderating influence of perceived legitimacy on participants' behavioural and attitudinal outcomes in RSPs would be a valuable addition to the insightful qualitative knowledge on this topic (Liebling, 2008). Finally, in congruence with the line of research on temporal discounting among incarcerated individuals, it is relevant to examine how reward gain and loss are experienced by participants in different RSP levels. Kahneman and Tversky's (1979) seminal work suggests that reward loss will generally be valued higher than reward gain (*loss aversion*), which is commonly explained by *negativity bias* (Baumeister et al., 2001). Hence, hypothetically, effects are more robust for incarcerated individuals who have much to lose (those in higher levels), compared to those who have little to lose (those in lower levels). As this review highlighted that good quality studies on this topic are scarce, it goes without saying that any future research should try to expose causal relations through the adoption of experimental designs.

Appendix B

Table B1
Characteristics of type-1 studies (N = 9)

ID	Study	Sample[a]	Technique[b]	Setting[c]	Target behaviour type(s)	Reward types	SMS score	Primary outcomes
1	Ellis (1993) US	N = 10 (M)	PR (PS)	Restrictive housing unit (U)	Attend education Be punctual Maintain personal hygiene Be respectful Follow orders Maintain area hygiene	Activities Internal freedom Material	2	Violent and assaultive behaviours (-) (.044).
2	Milan et al. (1979a) (study 1) US	N = 56 (M) M age = 24 yrs M IQ = 88.3	PR / NP (TE)	Experimental unit (Max)	Maintain personal hygiene Maintain living areas Complete education modules	Activities Internal freedoms Material	2	a) PR→ rule violations (-) b) No PR → rule violations remained low c) Follow-up → rule violations (+)
3	Milan et al. (1979a) (study 2) US	N = 56 (M) M age = 24 yrs M IQ = 88.3	PR / NP (TE)	Experimental unit (Max)	Watch news	Activities Internal freedoms Material	2	Time news watched (+)
4	Milan et al. (1979b) US	N = 56 (M) M age = 24 yrs M IQ = 88.3	PR / NP (TE)	Experimental unit (Max)	Increase academic achievement	Activities TE participation Internal freedoms Material	1	a) Education participation/ pass module tests (+) b) NP→ education participation/ pass module tests (++) c) Performance fell to pre-TE level after PR was terminated.
5	Kandel et al. (1976) US	N = 2 (M) Ages: 22 and ?	PR (PS)	State prison (Med)	Spend time on education Increase academic achievement	Material Social	2	Reading, language, arithmetic (+)

Table B1 *(Continued)*

ID	Study	Sample[a]	Technique[b]	Setting[c]	Target behaviour type(s)	Reward types	SMS score	Primary outcomes
6	Milan & McKee (1976) US	N = 56 (M) M age = 24 yrs M IQ = 88.3	PR / NP (TE)	Experimental unit (Max)	Be punctual Maintain area hygiene Maintain personal hygiene	Activities Internal freedoms Material Social	3	a) General level of performance (+). b) Day-to-day variations in response probability (-). c) Performance deteriorated after PR was terminated.
7	McKee (1972) US	N = 13 (M) M age = 27 (See Jenkins et al., 1974)	PR / NP (PC / TE)	Experimental unit (Max)	Conduct work Maintain personal hygiene Maintain are hygiene Increase academic achievement	Activities Material	3	a) Overall grade (+) (M = 0.6) b) 6/13 passed GED c) Efficiency (+) (Mdn. = 52.6%) d) On-task behaviour (+) (73.1)
8	McKee (1971) US	N = 16 (M) Age = 17-35 yrs	PR / NP	Experimental unit (Max)	Increase academic achievement	(U)	3	a) Test-taking (+) b) Task oriented activity (+)
9	Rice (1970) US	N = 10 (F) Age range = 11-15 yrs M IQ = 76	PR / NP (TE)	Correctional institution (U)	Increase academic achievement Participate in education Maintain personal hygiene Maintain area hygiene Be respectful Comply with rules	Material Social External freedoms	1	a) Language and reading (+) b) IQ (+)

[a] M = Male, F = Female, U = Unreported.
[b] NP = Negative punishment, NR = Negative reinforcement, PR = Positive reinforcement; (PC) = Performance contract, (PS) = Point system, (TE) = Token economy.
[c] SMax = Super-maximum-security prison, Max = Maximum security prison, Med = Medium security prison, Min = Minimum security prison, U = Unreported.
[d] Reward type categories were derived from Gendreau et al. (2018): Activities (e.g., access to pool table, or the gym area), Covert events (positive thoughts and self-evaluation because of mastery of a behaviour), Material goods (e.g., food, cigarettes), Social (e.g., telephone credit, letters allowed to send). We added, however, a distinct category for Internal freedoms (e.g., permission to go off-unit or additional time out of cell) and External freedoms (e.g., temporary community visits, leave, or eligibility to early or conditional release).
* Baseline target behaviours and reward types regulated by a national framework have been reported here (PSO 2006). Local prisons were allowed to use additional target behaviours and rewards. However, indications that such additions were in effect, were not found.

Table B2
Characteristics of type-2 studies (N = 8)

ID	Study	Sample[a]	Technique[b]	Setting[c]	Target behaviour type(s)	Reward types	SMS score	Primary outcomes
10	Meyers et al. (2020) US	N = 58 (M) M age = 37 yrs	PR / NP	Mentally ill unit (Max)	Participate in cognitive programmes Take medication Increase academic achievement	Activities Social	2	a) Mental Health scores (+)* b) Minor violations (+)*
11	Morar et al. (2019) ROM	N = 4960 (F = 198 / M = 4762) M age = 36 yrs	PR / NR / NP (PS)	All Romanian prisons (U)	Increase academic achievement Participate in cognitive programmes Participate in recreation	External freedoms Material Social	2	Early release/ Return to prison: Participants earning 100+ credits (N = 3775) compared to non-credited (<100) offenders a) Early release (+)* b) Reincarceration (-)*
12	Meyers, et al. (2018) US	N = 240 (M) M age = 32 yrs	PR / NP / NR	Restrictive housing unit (Max)	Participate in cognitive programmes Maintain personal hygiene Complete education modules	Internal freedoms Material Social	2	Psychosocial functioning / Violent behaviour over time: a) Major violations (-)* b) Staff assaults (-)* c) Inmate assaults (-)* d) Drug violations (-)* e) Minor violations (+) n.s. f) Mental health score (-) n.s.
13	Sharma & Marino (2017) US	N = 31 (M) Age = 18-21 yrs	PR / NP	Youth development unit (Max)	Actively participate in education Be respectful Follow orders Complete academic work Participate in cognitive programmes	Activities Internal freedoms Material Social	1	Academic achievement: a) Attendance rate (+) sig. U b) Academic performance (+) sig. U c) Motivation level (+) sig. U

Table B2 *(Continued)*

ID	Study	Sample[a]	Technique[b]	Setting[c]	Target behaviour type(s)	Reward types	SMS score	Primary outcomes
14	**Burdon et al.** (2013) US	N = 168 (F = 73 / M = 95) M age **34** (F) / 36 (M) yrs	**PR** (PS)	**F** (Min) **M** (Max)	Participate in cognitive programmes Complete treatment Participate in other activities Engage in recovery and prosocial behaviour	Internal freedoms Material Social	4	Engagement in prison-based drug treatment / prosocial functioning: a) Treatment participation: n.s. b) Treatment progress: n.s. c) Treatment satisfaction: n.s.
15	Liebling (2008) UK	Q: N = 1022 (F / M) I + O: N = 100 (F / M)	PR / NP	Five UK prisons (Med / Max)	Engage in sentence planning Complete risk and need assessment Comply with rules Maintain interpersonal contact*	Activities Material Social*	1	Attitudes toward reward system / Behaviour and order / Fairness and justice / Progress and participation: Mean findings for all 5 prisons were: a) Attitude to reward system (-)* b) Misbehaviour (~) c) Orderly regime (~) d) Making progress (-)* e) Participation (-)* f) Staff fairness (-)* g) Regime fairness (-)* h) Justice dimension (-)* i) Relations with staff (-)*
16	Feinstein (2003) US	N = U (M) Age = 14-18 yrs	PR (TE)	Juvenile correctional facility (Min)	Cooperate with others Complete academic work Participate in positive peer culture Work independently	Activities External freedoms	1	(Consecutive) problem behaviour (-)
17	Reid et al. (2000) US	N = 226 (U)	PR / NP	Restrictive housing unit (SMax)	Participate in cognitive, educational, vocational and mental health programmes Comply with rules Follow orders	Internal freedoms	1	Programme completion / return to restrictive housing unit: a) 188/226 participants successfully completed the program, sig. U b) Return to restrictive housing from less secure unit = 3.7%, sig. U

Table B3
Characteristics of type-3 studies (N = 4)

ID	Study	Sample[a]	Technique[b]	Setting[c]	Target behaviour type(s)*	Reward type(s)*	CASP score	Primary outcomes
18	Khan (2020) UK	N = 16 (M)	PR / NP	Special residential unit and general population unit (Med)	Behave well and responsibly Actively commit to rehabilitation Engage in purposeful activity Reduce risk of reoffending Behave well Help others	Material Social Internal freedom	Good	Incarcerated individuals expressed: a) Good relationships with staff à progression + extra activities b) Transparency, consistency and legitimacy → compliance (+) c) Introversion + compliance = visible (-) d) Understaffed → (-) monitoring à visibility (-)→ progression (-) e) Not all privileges were deemed equally attractive by all incarcerated individuals
19	Booth (2020) UK	N = 15 (F) M range = 26 – 47 yrs	PR / NP	Female private prison	Idem	Material Social Internal freedom	Good	Incarcerated individuals expressed: a) Restrictions on cash allowances, due to the IEP system, interfered with telephone contact, as all the mothers were positioned at 'entry' level in the first weeks of their sentence b) Being able to maintain contact with family was an important motivator for progressing through the system

Table B3 *(Continued)*

ID	Study	Sample[a]	Technique[b]	Setting[c]	Target behaviour type(s)*	Reward type(s)*	CASP score	Primary outcomes
20	Khan (2016) UK	N = 16 (M)	PR / NP	Special residential unit and general population unit (Med)	Idem	Material Social Internal freedom	Good	Incarcerated individuals expressed: a) Uncertain boundaries of target behaviours b) Unfair decision making by prison officers c) Procedural injustice leads to non-compliance e) Just and legitimate is rephrased by incarcerated individuals as respect f) Feeling of powerlessness regarding distributive outcomes (receiving privileges) g) The few incarcerated individuals which perceived the system as fair, held more positive attitudes toward staff and the system h) Enhanced incarcerated individuals reported more positive attitudes toward staff and system than Standard and Basic incarcerated individuals i) Incarcerates feel like being punished twice: by adjudication and by demotion
21	Crewe (2011) UK	N = 72 (M)	PR / NP	State prison (Med)	Engage in sentence planning Complete risk and need assessment Comply with rules Maintain interpersonal contact*	Material Social Internal freedom	Good	Incarcerated individuals expressed: a) Lack of predictability, that results from a discretionary style of governance, cause feelings of insecurity b) Psychological assessment by staff impinges on incarcerates' sense of agency and control over personal identity c) Indirect and untransparent behavioural assessment by staff resulted in a psychological burden of self-government, through incapability to live up to those responsibilities, which causes strain and/or resistance