

Australian National University | CENTRE FOR SOCIAL RESEARCH & METHODS

Criminal justice mobile applications:

A literature and scoping review

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We acknowledge and celebrate the First Australians on whose traditional lands we meet, and pay our respect to the Elders past, present and emerging.

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Executive summary

The increasing availability and use of applications for mobile phones (apps) has allowed for innovative solutions to address a range of issues, most prominently in the area of health behaviour change (see Koa & Liebovitz (2017); McKay et al. (2016)). Such advances in technology have also created opportunities within the justice context and the past decade has seen the development and increased use of mobile apps in the criminal justice system.

The Justice and Community Safety Directorate (JACS) of the ACT Government commissioned the Australian National University (ANU) to conduct a literature and scoping review of apps used in the criminal justice system which are designed to influence behaviour.

The focus of this review is on those technologies that support behaviour change among individuals involved in the criminal justice system and, in particular, on those technologies that aim to contribute towards the goal of reducing reoffending.

To this end, the review is structured as follows. We first present a brief overview of the state of research on the use of mobile apps in the justice context, arguing that, for the most part, the field is limited in its ability to demonstrate the efficacy of such apps, given the lack of evaluations conducted. We therefore highlight a number of general insights from the broader literature on the uptake, usage and successfulness of apps, which could apply to justice apps as well.

In the second section, we outline key concepts within behavioural economics which have been used as a theoretical basis for much of the research examining the use of technology to influence behaviour within the criminal justice space and more broadly. In particular, we discuss 'nudge theory', which refers to processes or techniques that take people's limited cognitive abilities into account, when designing products, processes or services, with the intention of influencing or shaping their behaviour and thinking, so that they make decisions that are better for them and society (Thaler & Sunstein, 2009).

In the third section, we outline the methodology for and scope of the review. Our review has two main aims, namely, to establish:

1. the extent of research conducted on the use of mobile technology (defined as Smartphone/ tablet technology, mobile applications and text message reminders) to influence behaviour in the criminal justice system; and

2. what criminal justice mobile applications are currently in the field and to develop a typology of these mobile apps.

A rapid evidence assessment was determined to be the appropriate review methodology to conduct the scoping review, with the methodology and implementation informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for reporting quality systematic reviews (Moher et al., 2009).

In the fourth section, we review the studies identified through the rapid evidence assessment. We examine two main focus areas for the use of mobile technology to influence behaviour of those in the criminal justice system—the use of text message reminders and mobile apps on an individual's smartphone.

In the final section, we provide an overview of the limitations of the review and a discussion of the findings and their implications for the use of mobile apps in the criminal justice system. Our review of the literature on mobile apps identified a number of features, including:

- co-design processes;
- the use of 'social technology', as a tool to create positive engagement;
- reminders of key dates;
- useful information on health, drugs and alcohol;
- problem-solving tools; and
- gamified features.

Although technology of this nature shows promise, we note that it cannot be assumed that people being released from prison into the community will have the necessary levels of digital literacy to take advantage of mobile apps designed to support them. In addition, our review revealed very few evaluations of the efficacy of justice apps or analysis of their intended outcomes. In the absence of systematic evaluations of their effectiveness, providers and users of criminal justice apps should apply caution when choosing an app to meet their needs.

Introduction

In May 2021, there were 3.15 million different 'apps' available on Google Play and 2.09 million available on Apple devices (Statista, 2021). Over the past decade, we have seen an increase in the use of digital or mobile apps in a justice context. An 'app' in this context refers to an 'application', which is a type of software that can be installed and run on a computer, tablet, smartphone or other electronic devices.

According to the Australian Bureau of Statistics (2018), in the period between 2016–2017, 86% of Australian households were connected to the internet, and of those 91% of Australian households used mobiles or smartphones. Given that the proportion of Australian households with access to the internet has been steadily increasing (from 79% in 2010-11 and 83% in 2012-13), it is likely that there has been even further uptake of digital connectivity in the years since these data were collected.

The past decade has seen the development of and increase in the use of digital or mobile apps in a justice context. Although the use of such "justice apps" has increased, there is currently little systematic research around their development, accessibility or effectiveness. The majority of such apps have been focused on dispute resolution, or are educational or supportive, by providing free access to legal information (Sourdin, Meredith & Li, 2020).

Within the context of justice apps, Sourdin et al (2020) have developed a taxonomy that describes how technology in general is reshaping justice systems and argued that

> at the most basic level, technology can assist to inform, support, and advise people involved in justice activities (what they call 'supportive technologies'). Second, technology can replace activities and functions that were previously carried out by humans ('replacement technologies'). Finally, at a third level, technology can provide for very different forms of justice, particularly where processes change significantly ('disruptive technologies'). Justice apps can fall within any of these three categories (Sourdin et al., 2020, p2).

The focus of this scoping review is on those technologies that support behaviour change among individuals involved in the criminal justice system, and in particular on the use of mobile applications (hereafter referred to as 'apps') in this pursuit. The paper first gives a brief overview of research into justice apps more broadly. It then provides a discussion of the

theoretical underpinnings of much of the research and development into the use of technology to facilitate behaviour change, by examining key behavioural economics concepts. The scope and methodology for the review is then outlined, including a discussion of the steps taken to identify studies for the review. The next section provides a review of the identified literature focusing on two types of technology—the use of text message reminders and the use of mobile applications in behaviour change within the criminal justice system. A brief discussion of identified mobile applications is then outlined and finally we present the limitations of the study and concluding remarks.

App research

There is a lack of research evaluating justice apps, with only a small number of published evaluation frameworks in the peer-reviewed literature, and most frameworks developed in the grey literature. To address this issue, organisations such as the European National Institute for Health and Care Excellence and National Institute of Mental Health programme officers developed a list of standards for mental health apps. This consists of four levels, which are data safety and privacy, app effectiveness, user experience and adherence, and data integration (Henson et al., 2019). These standards are not necessarily aimed at evaluating any specific app, but rather seek to provide guidance for informed app decision making (Henson et al., 2019). The New Zealand Ministry of Health has created an app evaluation guide, which assesses app quality on the basis of engagement, functionality, aesthetics and information quality (Sourdin et al., 2020).

In Australia, there have been few evaluations of justice apps. For example, the Penda app, created by the Women's Legal Service Queensland, aims to empower victims of domestic and family violence with access to legal, financial, and safety information, and was evaluated in a by Ithaca Group in June 2018 (see https://www.fincap.org.uk/en/evaluations/evaluation-of-penda--a-financial-empowerment-app). The evaluation identified strong user engagement, with users using the app consistently. During testing, accessibility and user friendliness were improved by using plain English, creating a search function and the use of icons and pictures, to name but a few examples (Sourdin et al., 2020).

However, most research into apps however occurs in the context of (mental) health apps and behavioural interventions (Kao & Liebovitz, 2017). As part of this rapid evidence review, we

highlight a number of general insights from that literature that determine the uptake, usage and successfulness of apps, which would apply to justice apps as well.

Despite the wide application of apps in medical research, Kao and Liebovitz (2017) have pointed out that there still remains considerable debate around their efficacy. Although the actual effectiveness of medical apps is of no direct relevance for our current purpose, the literature does provide indications as to what the general characteristics are of successful apps. For instance, successful apps tend to intrinsically motivate their users, by providing real-time engagement, reminders or gamified interaction (e.g. they are engaging). They also tend to have simple, intuitive user interfaces that do not require high cognitive demands (Chandrashekar, 2018).

Koa and Liebovitz described similar findings, but also highlighted issues around privacy and security concerns: because of the rapid increase of apps, the amount of personal data that is collected and stored (including, often, quite sensitive data) is also increasing dramatically. Often, app developers fail to provide explicit app privacy policies, and pay little attention to the apps' information security and privacy policies (Kao & Liebovitz, 2017)

There is some research that shows that sociodemographic factors, such as age and education, are significant variables for predicting whether a person will adopt a mobile device. For instance, younger individuals with more education tend to, overall, be more likely to use apps related to health (Carroll et al., 2017). This information should be borne in mind, in considering the likely use and utility of apps in the justice space, noting that people involved in the criminal justice system are generally younger adults with lower levels of education and literacy. Before turning to the methodology, the following section provides a general overview of the theoretical framework that underpins many of the apps discussed.

Behavioural economics and nudging

Behavioural economics is a scientific field informed by research from economics and psychology that aims to explain how individuals use cognitive heuristics to lead to suboptimal decisions that are often not aligned with (positive) longer-term goals (Loewenstein et al., 2007). Whereas classic economic theory assumes individuals make rational cost-benefit analysis of every action, behavioural economic research shows how individuals only have limited cognitive capacity and rely on 'fast and easy' heuristics that can lead to 'irrational' behaviour and decision-making (Thaler & Sunstein, 2009). Specifically, it has been demonstrated how

behaviour and decision-making are affected by social influence (e.g., what peers, friends, family think or how they behave), that individuals consistently value immediate over delayed gratification, overestimate the probability of positive events, while underestimating the probability of negative events, and are often motivated more by avoiding losses than receiving equivalent gains (Andor & Fels, 2018; Vlaev et al., 2016).

A key development in the behavioural economic space is nudge theory. In this context, nudges refer to processes or techniques that take people's limited cognitive abilities into account when designing products, processes or service, with the intent of influencing or shaping people's behaviour and thinking, so that they make decisions that are better for them and society (Thaler & Sunstein, 2009). Nudges are not considered coercive and do not explicitly restrict the choices available to the individual (Thaler et al., 2013). Rather, a nudge typically involves creating a 'choice architecture' that makes it more likely that individuals select an 'optimal' choice or behaviour. Choice architecture refers to the ways in which choices are presented to consumers and the impact of that presentation on consumer decision-making. For instance, a greater number of consumers will choose the renewable energy option for electricity when it is offered as the default option (Esmark, 2018), or when it becomes apparent that relevant others (e.g., neighbours) have adopted the option (Ölander & Thøgersen, 2014). For the purpose of the current review, the behavioural economics literature in general, and that on nudges in particular, is relevant, as it provides a number of (non-coercive) influences on behaviour and thinking that can inform app design considerations. A good example of this is the MINDSPACE framework (see Table 1), which describes how our behaviour is influenced not just by the message, but also the messenger, and that incentives and norms are powerful influences on behaviour (Vlaev et al., 2016). As a result, it is useful as a checklist to design services, products and, in the present context, apps.

Table 1: The MINDSPACE framework

Messenger	We are heavily influenced by who communicates information
Incentives	Our responses to incentives are shaped by predictable mental shortcuts such as strongly avoiding losses
Norms	We are strongly influenced by what others do
Defaults	We 'go with the flow' of pre-set options
Salience	Our attention is drawn to what is novel and seems relevant to us
Priming	Our acts are often influenced by sub-conscious cues
Affect	Our emotional associations can powerfully shape our actions
Commitments	We seek to be consistent with our public promises, and reciprocate acts
Ego	We act in ways that make us feel better about ourselves

Method and scope of this review

Our review has two main aims, namely, to establish:

1. the extent of research conducted on the use of mobile technology (defined as Smartphone/ tablet technology, mobile applications and text message reminders) to influence behaviour in the criminal justice system; and
2. what criminal justice mobile applications are currently in the field and to develop a typology of these mobile applications.

In view of the time constraints and available resources, a rapid evidence assessment was determined to be the appropriate review methodology to conduct the scoping review. The review used a systematic search and review strategy to identify relevant articles. The methodology and implementation were informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for reporting quality systematic reviews (Moher et al., 2009).

A purposive and targeted approach was taken to identify the best available evidence from both published and grey literature. Although not included in this review, there is also a growing evidence base for the use of mobile apps for mental health treatment (see for example

systematic reviews completed by Linardon et al., 2019; Rathbone & Prescott, 2017; Wang et al, 2018). Furthermore, we are aware of a growing evidence base for the use of smartphone technology in relation to substance use disorder treatment (Gustafson et al., 2014).

As a scoping review (Arksey & O'Malley, 2005), we sought to identify the key concepts, issues, gaps in the literature, and extent of current research into apps designed to influence behaviour in the criminal justice, and nature of research into such apps.

Inclusion criteria

The following criteria were used to determine whether studies were eligible for inclusion in the review:

1. The study must report on a mobile application or text message reminder
2. used to influence behaviour in
3. a criminal justice setting.

Identification strategy

Studies were identified using the following search methods:

- a keyword search of multiple electronic databases; and
- forward and backward citation searches of all eligible studies.

Full-text versions of identified studies were obtained through one of the following means:

- electronic copies via the ANU library;
- electronic copies of studies available from elsewhere on the internet; and
- paper copies, and electronic/paper copies requested from the authors themselves.

When any of the full-text versions of the works collated contained insufficient information to determine their eligibility for inclusion, according to the coding strategy (described below), where possible the corresponding author was contacted in an attempt to retrieve this information.

More generally, the review considered published and unpublished studies (including reports and dissertations). Due to resource constraints, only studies available in English were analysed. Given the relatively recent emergence of smartphone applications, only studies from 2017 were included in the search criteria. However, this did not preclude the inclusion of any earlier studies that were identified through the forward and backwards citation search.

Search terms

In order to discover as many relevant studies as possible, a number of search terms were used across two electronic scholarly databases (Scopus and ProQuest Criminology). The search terms used are detailed in Table 2 below.

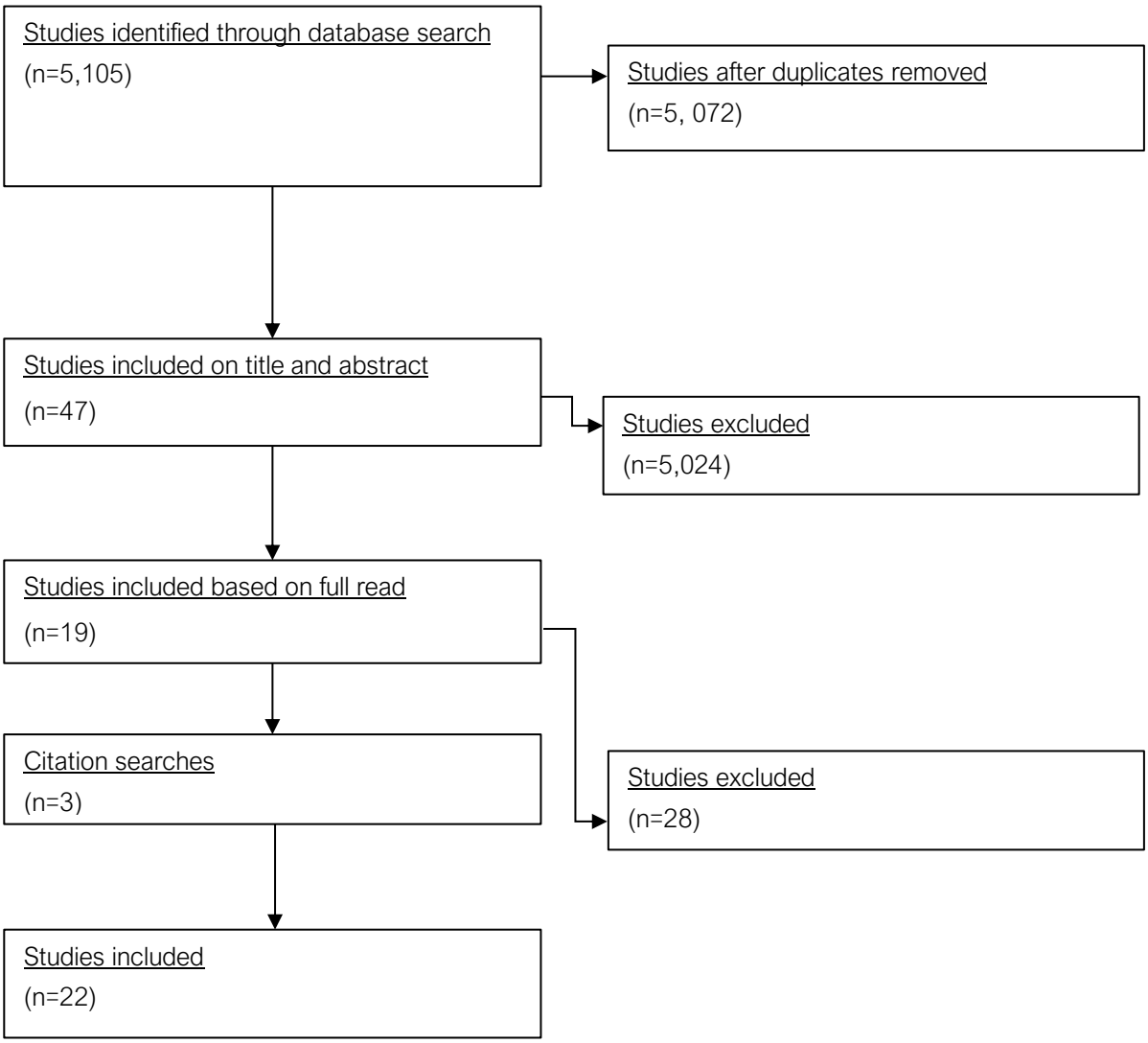
Table 2. Search terms

Technology terms	Criminal justice terms
App*	Bail
Behavio$ral economics	Breach*
Behavio$ral insights	Comply
Choice architecture	Compliance
Digital	Correctional
Fresh start effect	Community supervision
Geo-location tracking	Community-based orders
GPS tracking	Community corrections
Information-based prompts	Correctional supervision
Incentives	Court
Messenger effect	Criminal behavio$r
Nudg*	Crime
Smart Phone	Criminal
SMS	Desistance
Social norms	Justice
Status quo bias	Legal
Text message	Offen*
	Probation
	Parole
	Recidivism
	Reoffend*
	Remand

Data extraction and management

The first level of study screening involved examination of the title and abstract of those studies returned following electronic searches. Second-level screening involved reference cross-checking, at which point further irrelevant studies were excluded. Third-level screening involved the search of all literature cited by the included studies. This three-tier system ensured high-quality outputs for the review. Figure 1 below presents the search strategy employed. This process resulted in 22 relevant studies for inclusion in the literature review.

Figure 1. Search strategy



A separate web-based search was carried out, to identify examples of criminal justice mobile applications currently in the field. This search was carried out using key search terms, including 'app*', 'mobile app*', 'smartphone', 'bail", 'parole', 'corrections' and 'justice'. This search identified 19 examples, which have been categorised by target population and are described in Appendix A.

Review of the literature

Our review identified two main focus areas for the use of mobile technology to influence behaviour of those in the criminal justice system—the use of text message reminders and mobile applications on an individual's smartphone. The following sections summarise the key findings in relation to these topics.

Text message reminders

'Nudge texting', the use of text message or short message service (SMS) reminders, is a means of encouraging or guiding certain behaviour (Hapern, 2015). Research has suggested that a reason text messages may be effective is due to the high 'open rates', referring to the rate which a message is opened. For example, the 'open rate' for text messages has been reported to be as high as 98%, while the average rate for email was as low as 22% (Frost & Sullivan, 2010). By way of comparison, nudge text messages have been deployed in the health sector to promote a range of healthy behaviours including smoking cessation (Rodgers, 2005), increased physical activity (Hurling, 2007), and the self-management of chronic diseases such as diabetes (Kollman, 2007). They are now being used in the criminal justice domain, as a strategy to remind people of important dates. The research reported below reveals mixed findings for the effectiveness of this strategy for improving attendance at court.

In the United Kingdom (UK), Haynes et al. (2013) conducted a series of randomised control trials (RCTs) to test the effectiveness of text messaging, as a means of collecting fines. They designed a series of experimental messages, sent to individuals with an outstanding court-ordered fine. The text messages incorporated three key ingredients:

- the message sent a strong signal that non-compliance had been noticed and the individual was at risk of punitive action being taken against them;
- there was a time constraint for payment and a further warning that failure to pay would result in the case being referred to a bailiff; and
- finally, the text message was customised to provide details of each recipient's outstanding fine amount.

Haynes et al. found that sending a text message tripled the amount paid in fines, relative to the control group, who received no such text message. They further found that the personalisation of the message had the most effect on compliance. Haynes et al. highlighted, however, the importance of standardised and reliable mobile phone number collection processes within the

courts, as only half of the initial participant pool was reachable by text message, due to failures to consistently collect this data.

Sending text messages to remind individuals of upcoming court dates has been the subject of a number of studies. In another UK study using an RCT methodology, Chivers and Barnes (2018) sought to determine whether sending a reminder text message to defendants ahead of their court date appearance, in addition to the standard postal requisition, increased court attendance rates. The SMS reminder included the following content:

> "[FIRST NAME] Reminder [COURT TIME]@[COURT TOWN] Magistrates Court tomorrow. Please attend, most people do & avoid arrest & separate penalty"

Importantly, the message was personalised, by using the defendant's first name and drew on a 'social norms' approach, by informing the defendant that 'most people attend' (Chivers & Barnes, 2018: 19). However, the study found no evidence that sending an SMS reminder increased the likelihood of defendants appearing at court, and instead highlighted that the accuracy (or lack thereof) in mobile phone records was a major flaw in the nudge texting strategy to influence behaviour.

These text message strategies have been applied in the United States (US) as well. Cooke et al. (2018) employed a two-sided approach to reducing the failure to appear (FTA) at court rate in New York City. They first redesigned the summons ticket issued to defendants, to make the most important information stand out, and then created a series of text message reminders, targeted at helping people overcome identified barriers to attending court.

Through interviews with court participants, Cooke et al. found four main barriers, namely:

- 'mental models', referring to the belief that receiving a ticket and having to attend court for a minor offence was deemed 'unfair';
- 'present bias', suggesting that the immediate financial or psychological costs of attending court (such as having to take time off work) outweighed the consequences of non-compliance;
- 'social norms', highlighting that most recipients interviewed held the misconception that most people do not attend their court dates, which the researchers argued was likely to influence their own decision whether to attend; and
- 'inattention', referring to the fact that the length of time between receiving the summons and having to attend court meant that recipients simply forgot.

Using this information, Cooke et al. designed a series of text messages, using elements of consequences and plan-making in the body of the text, and sent these to recipients, either before the court date or after their failure to appear, notifying them to return to court within 30 days. Through an RCT approach, they found that pre-court date messages, using a combination of consequence and plan-making messaging, were the most effective in reducing non-attendance, with a 26% reduction in FTAs, relative to receiving no text message.

Other studies have examined the use of text message reminders, in conjunction with other reminder methods, including telephone calls. Lowenkamp et al. (2017) designed a randomised experimental trial, to examine the effects of two types of court notification strategies (telephone calls and text message reminders) on the FTA rate in the US state of Kentucky. Five groups were assigned a different intervention:

- a call with basic information containing the court date;
- a call with the same information, plus a warning;
- a text message with basic information pertaining to the court date;
- a text message with the same information, followed by another text message with a warning; and
- finally, a control group who received no message.

The interventions were then randomly assigned to a pool from a general pre-trial population (N=2000). Analysis of the results revealed no relationship between the type of intervention and the FTA rate. It should be acknowledged, however, that one limitation of their study which may influence the results was that participants were not given the opportunity to choose their preferred method of notification. Had they done so, it is possible that the results may have been more favourable to one or more of the interventions.

Nudge messaging has also been applied as a means of reminding people on probation for substance abuse of their goals while on probation. Using data from 76 offenders participating in a clinical trial of a two-session motivational computer program for treatment of substance abuse in Baltimore, Spohr, Taxman and Walters (2015) examined the effect of voluntary text or email reminders on participants' uptake of probation and treatment goals. At each session, participants were required to select a minimum of two goals – one probation- and one treatment-related – with a maximum of 14 goals. Participants were then given the option of receiving electronic reminders (either by email or text message) of the goals they had selected.

The goals were entered into a calendar, indicating the day and time for the goal to be met, which in turn would trigger an automatic text message or email reminder to be sent at the selected time. The analyses revealed that those probationers who chose to receive electronic reminders (45% of the sample) had more goals and attended more treatment sessions than those who chose not to receive a reminder. A limitation of the study was that it only assessed substance use and treatment initiation at a two-month follow-up. Accordingly, the results cannot be assessed for more distal criminal justice outcomes, such as rates of recidivism.

Text message reminders have also been employed, in an attempt to reduce non-appearance rates of victims and witnesses in criminal cases. Cumberbatch and Barnes (2018) conducted an RCT, by sending a 'personalised and simple' reminder message to witnesses who were scheduled to appear in court in three days' time. The researchers randomly assigned the text message treatment to 405 of 811 victims who were sent a postal notice to attend court. Cumberbatch and Barnes (2018) theorised that sending a personalised text message may provide a 'light touch' that encourages behaviour change. The example message is as follows:

> STAFFORDSHIRE POLICE REMINDER: <Insert name>, you are required to give evidence at <insert court name> on <insert date>. Upon arrival, please report to the main reception by <insert time>. If you have a problem attending please contact us on 01785 235648 (police reference <insert number> URN).

Cumberbatch and Barnes found no significant difference between the treatment and control groups. In fact, there was a slight decrease in court attendance rate in the treatment group, compared with the control group. They therefore concluded that, if a person who is warned to attend court simply does not want to attend, a text reminder will not change their decision.

Similar research was conducted by Monnington-Taylor et al. (2019), in another RCT designed to test the impact of an intervention aimed at improving victim and witness court attendance by those assigned to the West Midlands Police's Witness Care Unit in England. The intervention consisted of three elements:

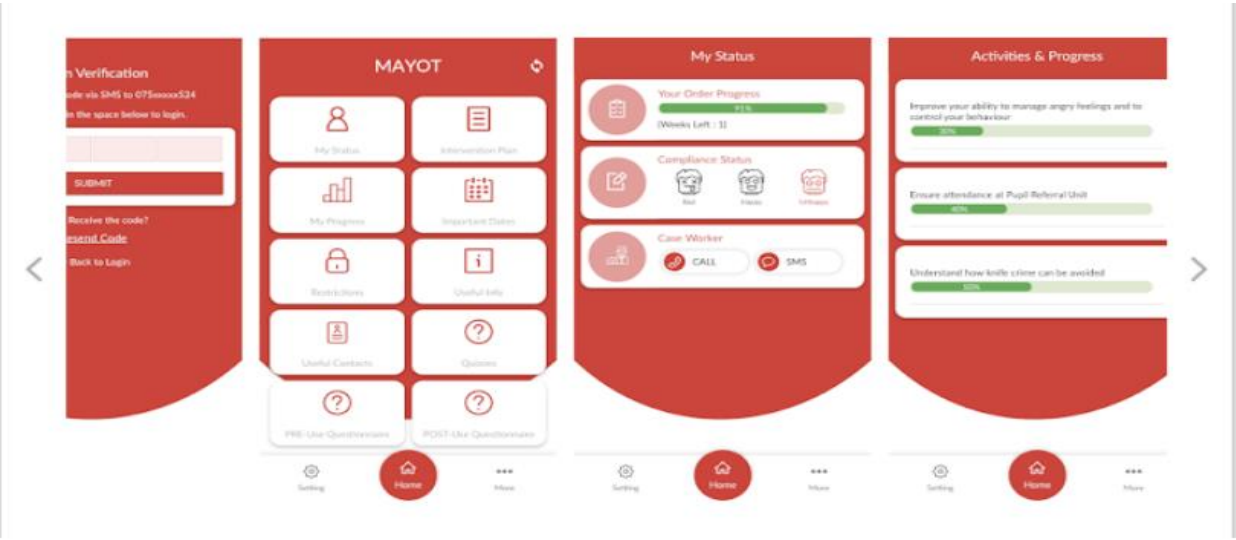
- a new conversation guide for case managers to use when first 'warning' victims and witnesses of the need to attend court;
- a redesigned warning letter, using nudge principles; and
- a new reminder call and SMS, sent approximately one week ahead of the court date.

Analysis of the results revealed findings in line with Cumberbatch and Barnes' (2017) findings, suggesting that the nudge approach did not increase court attendance.

Mobile apps

As set out above, the second area explored in the literature is the development of specific justice apps for smartphones (although they can also be used on other devices, such as tablets). Barn and Barn (2019) described the development of an experimental mobile app called Mobile Apps in Youth Offending Teams (MAYOT) (see Figure 2 below), in the of youth justice context in England. The purpose of the MAYOT app is to help reduce re-offending behaviours in young offenders. It helps young offenders and their caseworkers ensure compliance with court orders and meet supervisory requirements around key goals and outcomes. It uses 'social technology' to achieve this, in that it uses software or technology, as a tool to create positive engagement with young people involved in the youth justice sector. The app has a number of features that were co-designed with key stakeholders (e.g., young people, case-workers and managers), such as automated reminders of key appointments, scheduled activities, visual displays of personalised goals/objectives and progress, nudging around curfew times and exclusion zones, access to relevant contacts, and useful information on health, drugs and alcohol, stop and search powers, and knife crime.

Figure 2. Interfaces of the MAYOT app



The app was designed to alleviate workload for youth justice practitioners, and is aligned with their typical activities, such as devising an intervention plan, setting up meetings with service

providers and other meetings. The client receives timely SMS reminders and notifications to help them with their requirements. Case-workers were provided with training to use the app, including case scenarios on how to navigate their way around the technology. To enhance the utility of the app case-workers could use the software on their desktop computers and send information that clients could access on their mobile phones.

Barn and Barn's (2019) research focuses on the experiences and views of practitioners, rather than the experiences of the clients (e.g. the young people), which is something of a limitation. Their main finding is that the app provided considerable flexibility for the case-workers, by automating the provision of useful and timely information to the young person. However, practitioners tended not to embrace technology as panacea. Nor was it an excuse not to engage actively with their clients. There seemed to be a general consensus that the technology achieved the best results when embedded as a digital tool within the overall process of rehabilitation. A concern was raised about the potential of using the app as a surveillance tool, for instance, to track whether a text was received.

Elphick and colleagues (2021) have described how apps can be used to increase police trustworthiness, and citizens' willingness to cooperate with police. They argued that digital technologies can help to create shared identities and online communities and allow 'digital citizens' to participate in and challenge the practices of authorities and institutions. They reviewed 240 existing online citizen/police and relevant third-party communication apps, and identified a number of design considerations for those developing digital mechanisms (as stand-alone apps or integrated into websites) for community/police collaboration. Although not all of these considerations would apply in the current context, a number of them do. Elphick et al. found that digital mechanisms:

- should provide privacy policies that are readable and easily discoverable by the user. Users need to be able to trust that their data will only be used in ways to which they have provided informed consent;
- might consider providing anonymous reporting options that give the user control over what kind of personal data they consent to sharing when making an initial report (e.g., IP addresses), and control over who can see the report (e.g., specially-trained officers when dealing with sexual abuse reports);

- should make explicit how the report will be used and what will happen to the report, so that users know what they are consenting to when reporting. This can be achieved using contextual help features, demonstrations and/or screenshots;
- might consider including items designed to empower users in positive ways, so that they can participate in and challenge authorities and institutions, they can keep themselves and communities safe, and they can become an active part of building transparency and trust;
- should not include items that have the potential to incite vigilantism, such as sex offender mapping;
- might consider including items designed to engage users, so that they can participate in, create, and contribute to content. This should help to create an identity with shared values, where police see themselves, and are also seen, as citizens, and citizens can contribute to policing;
- should share accurate and timely information with users, but take care not to filter it in a way that either patronises users or masks elements that are key to transparency and building trust. It might also be worth considering including elements that encourage two-way information sharing and feedback; and
- should be easy to navigate, with buttons that provide direct and clear links to functions, rather than navigation loops, broken URLs, or unnecessary links to webpages. They should also look simple, clear and uncluttered.

Fagan (2017) described how the New Zealand Department of Corrections rolled out smartphones to over 3000 staff, to aid them with their day-to-day work operations. The introduction of smartphones resulted in a significant improvement in staff mobility and productivity. The example of two specific applications, which aimed to improve the day-to-day operations and safety of their community corrections staff, were described in more detail. One was an offender contacts application, which was developed and tested with 1000 community corrections staff. The app allows probation staff to access information about people on their allocated caseload from the Department's Integrated Offender Management System, while away from their desk. It provides a convenient way to safely store relevant files on password- and biometric-protected smartphones, rather than having to carry paper files that can be easily misplaced. The feedback from staff was overwhelmingly positive, citing improvements in productivity, safety, and security. More specifically, it allows staff to:

- access information to cases allocated to them anywhere;
- review information, including the 10 most recent case notes;
- review risk and alert information;
- make a phone call or send a message directly from the app;
- access address information and navigate through Google maps directly from the app; and
- create a list of people the staff member interacts with frequently.

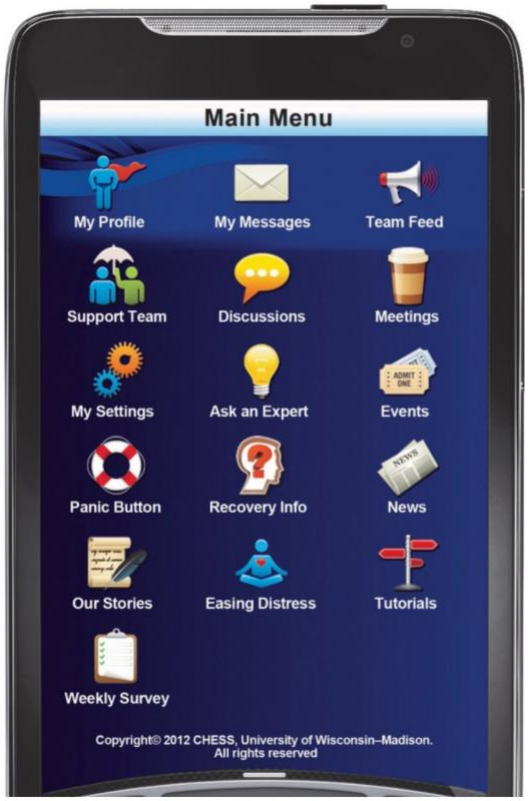
The paper also describes a staff safety app, which is a standard app available on most Samsung smartphones. It allows staff to quickly and discreetly notify their office if they feel their safety has been compromised. This app demonstrated its usefulness, when a staff member, who was involved in a serious incident, was able to notify the office, who notified the police, who were able to get to the staff member within six minutes and de-escalate the situation.

Gershowitz (2019) has described a number of criminal justice apps, ranging from apps that teach individuals about the law, help suspects and defendants connect with lawyers, assist defendants in navigating the judicial system, and undertake reform efforts, by attempting to bring about systemic changes to problematic areas, such as the bail process. A good example in the present context is an app backed by rapper and entrepreneur Jay-Z called 'Promise', which provides an alternative to the conventional bail process in the US. The app is currently being developed, but it will 'monitor and support participants', by generating a calendar of obligations, such as court appearances, drug testing, and substance-abuse counselling, and then remind users to attend these obligations. It will also provide referrals and support for job training, counselling, housing, and other needs. In addition, it will allow case-managers to 'monitor compliance with court orders and better keep tabs on people via the app'. Gershowitz (2019, p15) argued that criminal justice apps just as Promise serve a democratic purpose, by making the criminal justice system more understandable and helping even the playing field for disadvantaged groups. He warned, however, that expectations should be tempered, largely because the law is too complicated and legal processes too intricate, for many apps to deal with. He also highlights that there is currently no real driver by an important institutional player behind the development and uptake of criminal justice apps, and that, although likely to be positive, the impact of these apps is likely to be modest overall.

Johnson and colleagues (2016) described a pilot test of an app called A-CHESS (see Figure 3 below). This app is intended to address the need for better substance use disorder treatment

and recovery tools in the US, where large groups of people are referred to substance abuse treatment. Many people in this group never complete treatment or show high relapse rates. Although the study shows that participants (N=30) did in fact open and use the app on as average of 62% of the days that they had the app, the paper does not provide any data on the effectiveness of the app, in supporting and managing recovery from drugs. However, the app has been tested with other populations, where it has proven its effectiveness. A key aspect of the app is that it was developed around principles of self-determination theory, which has been shown to be effective in creating behaviour change in many different contexts (Deci et al., 2017; Patrick & Williams, 2012), and which often underlies gamification apps (Sailer et al., 2017).

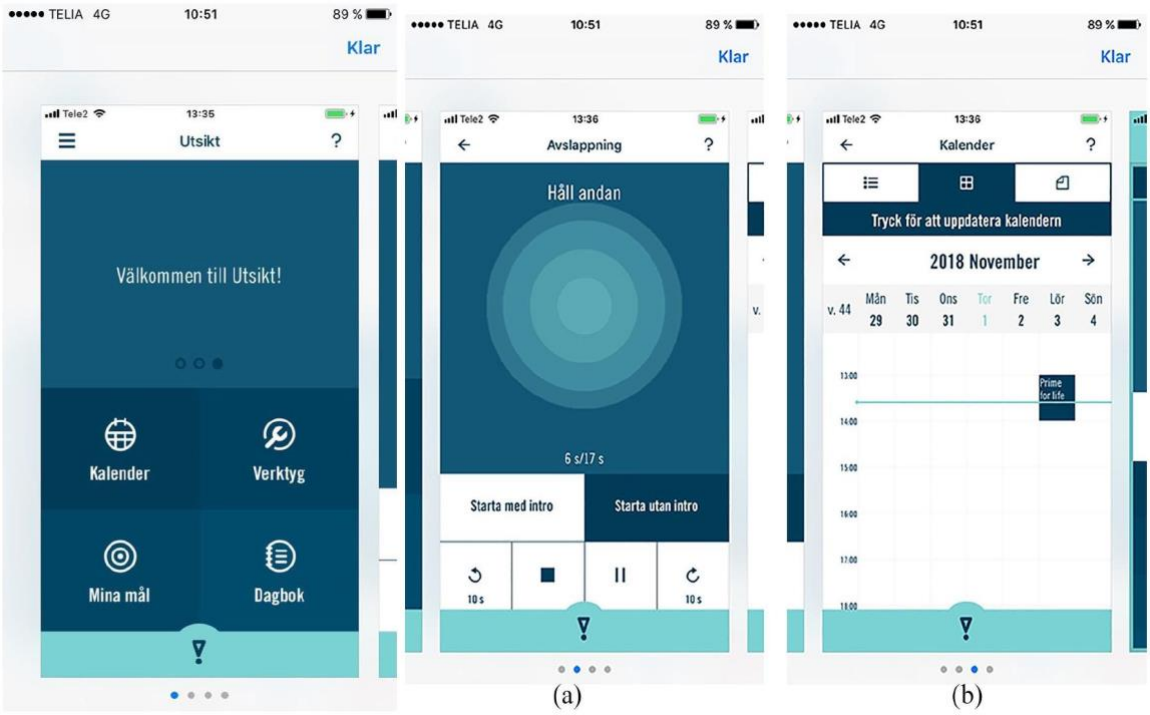
Figure 3. The main menu of A-CHESS



Kaun and Stiernstedt (2020) described a smartphone app that aims to improve attendance at probation meetings and provide users with exercises based on cognitive training, to help them deal with challenging situations. The app, called Utsikt (view, prospect, outlook) (Figure 4), was the first of its kind developed in Sweden. It was tested and co-designed with 19 people on probation. A probationer can meet with their probation officer to personalise the app and can

choose from a number of cognitive exercises to deal with, or prepare for, stressful situations. For instance, there are breathing exercises for stressful encounters, a number of scenarios for problem-solving, as well as hotlines that provide support during critical episodes, to prevent recidivism. Users can also keep track of their mood, with the help of a journal function. Importantly, the app developers emphasise that the app primarily aims to prevent recidivism, rather than controlling or supervising clients. Users can opt out of use of the app, without affecting their relationship with the probation services. The app does not share data with any central service or agency, except for the synchronisation of calendars. There is, however, no way for the client to develop an insight into the 'back-end' of the app, so the claims of the developers have to be taken at their word.

Figure 4. Interfaces of the Utsikt application



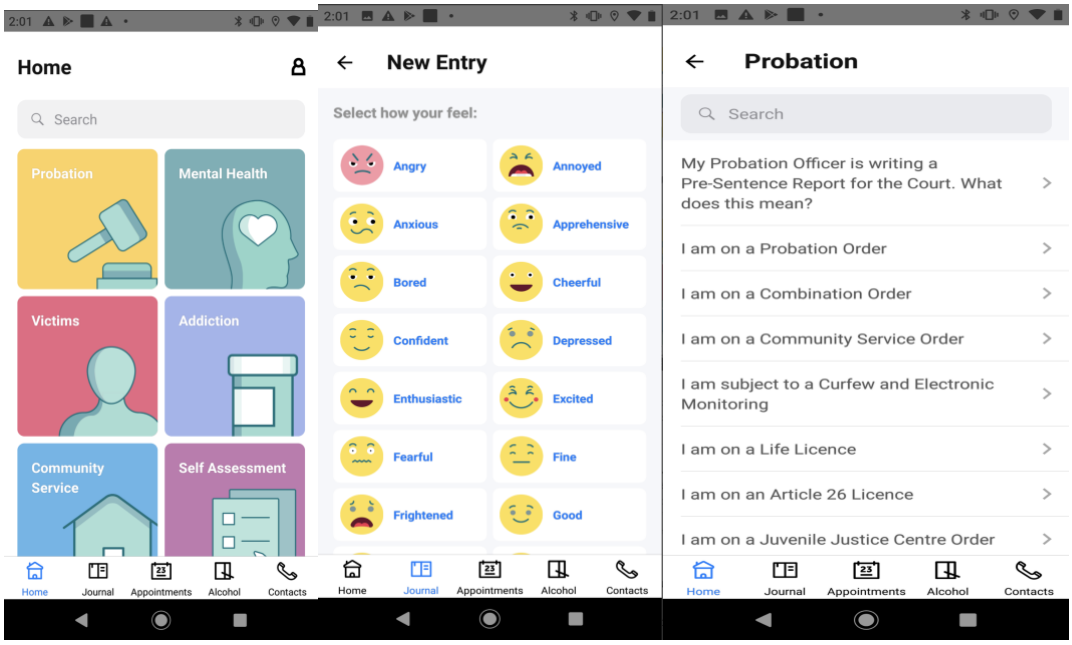
McGreevy (2017) described an app called 'Changing Lives', which was launched in October 2016 by the Probation Board for Northern Ireland. This app aims to assist offenders to desist from crime and help offenders who are struggling with mental health issues or addictions to identify their problems and find support. The app has a number of key functions:

- it includes a journal, which allows users to keep track of their thoughts and how they are feeling. In line with mobile devices, users can select from a set of emojis, to indicate their

current mood, which mitigates the impact of often low literacy rates amongst service users.

- an appointments and calendar section enables users to schedule their next probation appointment and receive reminders as often as they like;
- a section on probation brings together information on probation orders, or any other court order, and explains what the order means, what is required of the person and the consequences of non-compliance with the order. This section aims to set out in simple terms the expectations and requirements of each element of probation supervision; and
- mental health and addiction sections which provide resources and support to people struggling with mental health issues or addiction. For instance, these sections provide information on depression and anxiety, which many people on probation suffer from, and telephone crisis helplines. The addiction section provides '10 top tips for overcoming addiction', which was put together by a team of psychologists.

Figure 5: Interfaces of the "Changing Lives" app



Although not strictly a mobile application, Morris and colleagues (2021) reported on work around the use of digitally-enabled desistance-focussed conversations. Specifically, they described the development of a toolkit called 'Spectrum', aimed at men who have committed intimate partner violence offences (Morris et al., 2019). The toolkit uses digital media to

present stories of people with relevant lived experiences, which aims to help clients in difficult situations to avoid relapsing into violent behaviour and instead promote positive behaviour change. They argued that such digitally-enabled toolkits present an opportunity to develop, pilot and evaluate digital services that can complement traditional, or established, desistance journey approaches.

Mossler and Blank (2014) described the app MyNeON, which is focused on connecting probation clients in particular 'target' neighbourhoods to opportunities, resources and services. It aims to encourage positive behaviour change, by 'gamifying' participation in community activities, e.g. users can earn points for items that community leaders enter into the app. In addition to providing users with a gamified experience, the app also generates geographic data that can be used by policymakers to identify which services are being used and whether there are any communities in which particular goals are not achieved or represented.

Ross (2018) provided an extensive review of how digital apps can be useful in treating and supporting the needs of offenders. Ross argued that there are three key challenges in this area:

- it is not easy to identify 'good apps' that are effective for practitioners and service users;
- it is not always obvious how traditional forensic treatment approaches can work in a digital app environment; and
- getting stakeholders to both discover and consistently an app is a serious challenge.

Despite these challenges, Ross concluded that digital apps are likely to become a necessity, given the concurrent increase in demand and decrease in financial resources to meet that demand.

Examples of justice smartphone apps identified

As mentioned earlier, the research team also undertook an online search of justice apps currently in use. The focus of the search was on apps designed to influence the behaviour of people engaged in the criminal justice system. The search identified 19 mobile apps, of which 14 were designed for use by an offender on probation, three were for use by community correction officers in their management of offenders, and two apps were designed for victims of crime (see Appendix A). Most of the apps we identified are for use in the US (N=14). Only two Australian apps were identified, with the other three apps originating from the UK and Sweden. Several apps designed for use by offenders or their community correction officers

contain tracking features or check-in functions, designed to be used in conjunction with, or in lieu of, other forms of tracking devices.

We note that the list presented in Appendix A is not exhaustive; rather, it is indicative of the types of mobile apps currently in use and provides an overview of the key features which may be of utility in future mobile app design. We are also aware of a plethora of mobile apps designed to provide advice to individuals navigating the legal system (see for example the Australian app, Legal Literate (https://www.legalliterate.org.au/)). These apps have not been analysed here, as they are outside of the scope of this review.

Limitations of the review

A number of limitations of our review must be acknowledged. First, there is scant empirical research into the use of apps designed to influence behaviour in the criminal justice system. This is likely due in part to the relatively new development of such technology.

Second, our review identified a lack of research evaluating justice apps, with only a small number of published evaluation frameworks in peer reviewed literature, and most frameworks living in the grey literature. Rather, most studies focused on describing the mobile app and how it is used in a particular setting. As a consequence of this and due to the fact that very little research has been carried out in the area more generally, the review is not able to provide much insight into whether such apps work in changing behaviour and promoting desistance.

Organisations such as the European National Institute for Health and Care Excellence and National Institute of Mental Health program officers have attempted to address the issue of a lack of evaluation, by developing a list of standards for mental health apps, which consists out of four levels, namely: data safety and privacy, app effectiveness, user experience and adherence, and data integration. These standards are not necessarily aimed at evaluating any specific app, but rather provide guidance for informed app decision making (Henson et al., 2019). As noted above, however, the New Zealand Ministry of Health has created an app evaluation guide, which assesses app quality on the basis of engagement, functionality, aesthetics and information quality (Sourdin et al., 2020).

Finally, as a result of our search terms and inclusion criteria this scoping review excluded mobile technology deployed in other areas such as health care and mental health. Most

research into apps however occurs in the context of (mental) health apps and behavioural interventions (Kao & Liebovitz, 2017).

Discussion and conclusion

This review has highlighted the paucity of literature that exists in relation the use of digital technology to influence behaviour within the criminal justice system. We conducted a rapid evidence assessment of the extant literature that identified 22 studies relating to the use of either nudge texting or mobile apps in this context. These studies identified a range of problems that digital technology is attempting to address, from increasing the rate of court attendance, to promoting compliance with probation conditions and increasing trust in the police.

Our review of the literature on mobile apps identified a number of features, including:

- co-design processes;
- the use of 'social technology', as a tool to create positive engagement;
- reminders of key dates;
- useful information on health, drugs and alcohol;
- problem-solving tools; and
- gamified features.

Outside of this literature, a web-based search identified at least 16 mobile apps that are currently in the field, with the majority of these in use in the United States for people on community supervision (see Appendix for further details). A number of these apps are used for monitoring purposes, containing features including GPS location tracking, facial recognition, voice verification, and on-demand location check-ins. The use of smartphone tracking has been criticised for creating 'digital prisons', in which parolees feel like they are 'being locked up again' (Feathers, 2021, np).

Digital literacy is an issue that has not been examined in this review. While the majority of people in Australia use mobile phones, increasingly including smartphones (ABS, 2018) people in prison do not have access to such technology. Therefore, it cannot be assumed that, upon release from prison and back into the community, these individuals will have the necessary levels of digital literacy to take advantage of mobile apps designed to support them. Future research should examine ways in which prisons can adequately upskill detainees to keep up-to-date with emerging technologies (Van De Steen & Knight, 2017).

The review also revealed very few evaluations of the efficacy of justice apps or analysis of their intended outcomes, with only a small number of published evaluation frameworks available in the peer-reviewed literature and most frameworks developed in the grey literature. This is unsurprising, given the relative infancy of the field, but, in the absence of systematic evaluations of their effectiveness, providers and users of criminal justice apps should apply caution when choosing an app to meet their needs.

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Appendix A. Overview of mobile app products for offenders, community correction officers and victims

Mobile apps for offenders		
App name	*Description*	*Key features*
aCheck[1] **(US)**	aCheck is used for offender biometric check-in, through facial recognition, voice verification, and self-reporting. The app electronically records location and activity compliance, sends appointment reminders, and provides two-way voice and text communication between corrections staff and offenders.	• Biometric identification – facial recognition and voice verification confirm the offender's reports. • Self-report – provides a low-cost offender monitoring option. • Messaging – contacts offenders through the app. • Calendar – displays appointments. • Documents upload – uploads documents from phone's camera or gallery. • Community resource page – finds local rehabilitation, transportation, medical and other services.
A-CHESS[2] **(US)**	A-CHESS is an interactive smartphone app that provides information, adherence strategies, decision-making tools, and support services to patients with alcohol use disorders.	• Secure messages • Support team contacts • Discussion board • Meeting log • Events • Panic button

[1] https://play.google.com/store/apps/details?id=com.attenti.acheck.us&hl=en_US&gl=US

[2] https://www.c4tbh.org/program-review/addiction-comprehensive-health-enhancement-support-system-a-chess/

		• Recovery information • News • Easing distress information • Tutorials • 'Ask an expert' • Weekly survey •
Avow[3] **(NSW, Australia)**	Avow is a free phone app for people in NSW who have an Apprehended Domestic Violence Order (ADVO) or a domestic violence charge. Avow's information, planning tool and tips can help users better understand and comply with their ADVO conditions and prepare for court. The app means users can find their ADVO and court information directly from their mobile phone and read about the court process, the consequences of breaching an ADVO, and use Avow tools to comply with their order.	• PIN access for security • Frequently-asked questions about ADVOs • Automatic reminders to attend court and other key dates • Easy access to the user's ADVO • Tools and tips • Links to services
BI SmartLINK[4] **(US)**	BI SmartLINK is a suite of software and secure communications tools designed to be placed on a smartphone owned by a person under community supervision. The app enhances supervision and case management capabilities and increases the potential for successful program completion, by providing valuable services, such as calendaring appointments and connecting the client to community resources.	• Calendar events • Useful resources

[3] http://www.crimeprevention.nsw.gov.au/domesticviolence/Pages/Avow.aspx
[4] https://bi.com/products-and-services/smartlink-offender-monitoring-mobile-application-software/

Changing Lives[5] **(UK)**	The app aims to assist offenders to desist from crime and help offenders, who are often struggling with mental health issues or addictions, to identify their problems and find support.	• Journal • Appointments and calendar • Information on probation and court orders • Resources on mental health and addiction • Self-assessment
ConnectComply[6] **(US)**	ConnectComply is a smartphone app check-in solution for drug court participants that tells them if they are due for a drug or alcohol test that day. By taking a selfie with the app, participants satisfy their daily drug test check-in obligation. The ConnectComply app then uploads their image, date and time the photo was taken, and geolocation data for that phone. In return, the person is given a message informing them if they are due for a drug or alcohol test that day.	• Location monitoring • Secure two-way messaging • On-demand locations checks • Scheduled location verification
MAYOT App for Youth Justice[7] **(UK)**	The MAYOT app allows case workers to provide relevant, timely information to a young person to help them manage the requirements of their youth justice order. It also includes features, such as appointment reminders and encourages communication through direct access to relevant contacts, such as professional and personal support networks.	• Progress tracker • Order status • Compliance status • Restrictions (exclusion zone map) • Useful contacts • Intervention plan • Important dates • Easy access to useful information • Quizzes • Pre- and post-use questionnaire

[5] See McGreevy (2017)
[6] https://reconnect.io/
[7] http://www.mayot.mdx.ac.uk/project-overview/

MyNeON[8] (US)	MyNeON was launched as part of the New York City Department of Probation's (DOP) Neighbourhood Opportunity Network (NeON) program. The app is rewards-based, designed to promote positive behaviour change in people on probation, by providing incentives for participation in community goals. Probation clients digitally track and earn points for items that community leaders enter into the app.	• Personalised list of community events or goals (e.g. job training classes, mentoring programs, education and literacy courses, volunteer opportunities). • Direct messaging from the DOP to clients about potential job opportunities and other information.
Pokket[9] (US)	Designed to empower the individual, Pokket connects offenders, returning citizens with their parole officer, treatment provider, workforce housing and/or different counselling options.	• SMS text reminders • Broadcast messaging • Private messaging • Selfie check-ins • Secure file sharing • Work queues • Case plans • Dashboard shows clients what tasks to complete • Electronic referrals to services
SCRAM Touchpoint[10] (US, Canada)	The SCRAM TouchPoint mobile app is used to enhance communication between clients and parole officers, making community corrections programs more efficient. SCRAM TouchPoint is used to promote compliance with conditions of both low-and-high-risk clients. It is used in conjunction with electronic monitoring systems.	• Secure and stored messaging • Mobile phone check-ins • Automated electronic monitoring reminders
Shadowtrack[11] (US)	The Shadowtrack mobile application is designed to fit the special needs of probation, parole, courts, pre-trial	• Location verification

[8] https://datasmart.ash.harvard.edu/news/article/changing-probation-in-new-york-city-with-an-app-383
[9] https://www.ksat.com/news/local/2021/01/09/woman-creates-app-to-give-newly-released-prisoners-vital-connections/
[10] https://www.scramsystems.com/monitoring/scram-touchpoint/
[11] https://www.shadowtrack.com/

	services and intervention programs, and other corrections-related services, including curfew management, self-reporting, sobriety test sessions, location and voice verification, and facial recognition and notifications. The app provides a tool so that a person's mobile phone can be used for monitoring purposes. The Shadowtrack app sends alerts to the user's mobile device when they are required to initiate a location check, perform a sobriety test, or check in for curfew or self-reporting. The information gathered once an alert is completed by a user is reported back to the appropriate entity, via the Shadowtrack platform.	• Voice verification • Facial recognition • Self-reporting • Sobriety test
TRACKtech (TrackPhonelite)[12] **(US)**	TRACKtech pairs its messaging and automation software with more enforcement capabilities (location-tracking and geo-fencing alerts, for example) and a case management dashboard for supervisors. It is essentially a ranking system. If an officer has 100 parolees to supervise, for example, the app can offer an 'early warning' system of cases that need attention.	• Biometric ID verification • Voluntary one-touch location check-in • Compliance monitoring • Calendar reminders for appointments, court dates and other meetings • Video teleconferencing allowing for remote communication (via Cisco WebEx) • In-app messaging (SMS) • Mobile breathalyzer (optional feature) • Behavioural health assessments • Nearby homeless shelter information • Agency-configured self-reporting questionnaires • Rehabilitative support, telemedicine, cognitive behavioural therapy, and skills training

[12] https://tracktechllc.com/products/#trackphonelite

		• Pro-social messaging/compliance rewards
Uptrust[13] **(US)**	This platform has two functions: communication between parolees and officers; and notifications to remind parolees of upcoming appointments and other parole conditions.	• Video-chat function • Automated reminders • Direct messaging between parolees and officers
Utsikt (Sweden)[14]	A smartphone app that aims to improve attendance at probation meetings, and provide users with exercises based on cognitive training to help them deal with challenging situations. The app is downloadable for free and can be adjusted to the individual needs of the client.	• Breathing exercises for stressful encounters • Mood tracker • Journal • Hotline numbers • Calendar
Mobile apps for community correction officers		
DXC Offender360[15] **(US)**	Web-based, desktop, mobile application that provides probation officers with the tools they need for managing cases, tracking referrals, managing providers, accessing activities, and entering key customer information in the field.	• Re-entry planning • Supervision management planning • Administrative sanctions • Violation reports and hearings • Recidivism management and tracking • Earned time credits • Sex offender identification • Case management • Detainers and warrants • Risk assessment • Drug testing • Treatments and medications • Security planning and governance • Scheduling and appointments

[13] https://uptrust.co/about-us/
[14] See Kaun and Stiernstedt (2020).
[15] https://www.dxc.technology/enterprise_and_cloud_apps/offerings/145028/145100-dxc_offender360_probation_and_parole_management

Message Media[16] **(US)**	Message Media enables parole officers to send ad-hoc messages to individuals or mass messages to a group of parolees.	• SMS reminders
Telmate Guardian[17] **(US)**	Telmate Guardian is an offender monitoring software product used by community corrections personnel to supervise offenders on parole, probation, pre-trial or work release. When installed on a smartphone, it captures location information, as well as biometrics, such as facial photos and voice samples.	• Secure login via mobile phone number and PIN • Check in ID verification via image and voice recording • GPS location monitoring • Push notifications and SMS reminder alerts • Routed-device and location spoofing protection • User performance summary • Customer service access • Web console for case-managers
Mobile apps for victims of crime		
PENDA[18] **(AUS)**	Penda is Australia's first financial empowerment app for women, with a domestic and family violence (DFV) focus. Penda is a free, simple-to-use app with national safety, financial and legal information and referrals for women who have experienced DFV. It has been tailored for intimate relationships, but may still be relevant to other relationships, and women who are separating where DFV is not present.	Advice on: • Safety • Money • Domestic and family violence • Visa and immigration • Children • Legal matters • Housing • Wellness • Services and key information

[16] https://messagemedia.com/us/case-studies/sms-reminders-reduce-parolee-no-shows/
[17] https://www.telmate.com/guardian/
[18] https://penda-app.com/about/

VONA[19] **(US)**	TRACKtech's Victim/Officer Notification App (VONA) is designed to reduce the risk that the victim will come into contact with an offender.	• Victim/Officer Features – VONA notifies the victim or officer if a TRACKtech Program Member is unexpectedly in the vicinity. Instructions are then given for a safe exit path, resulting in avoiding contact with the Program Member. • Dynamic geo-fencing – detects proximity of TRACKphone devices (used by an offender) to the victim/officer app.

[19] https://tracktechllc.com/products/#trackphonelite