

_____ **Research Report** _____

**Offender Behaviour:
The Influence of Institutional Design**

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**Offender Behaviour:
The Influence of Institutional Design**

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Executive Summary

Key words: *institutional, design, offender behaviour, multi-level modeling*

Features of an environment, both physical and social, are known to influence the behaviour of those within it. This pattern has been found in a variety of contexts, including correctional institutions. However, research in the correctional context has, to date, largely been limited to the U.S. Given that approaches to penitentiary design have changed over time, the institutions for which CSC is responsible differ in terms of their physical design characteristics; as such, a study was undertaken to expand this research to the Canadian context and determine if and how differences in institutional design were associated with offenders' behaviour.

The study focused on men offenders classified as medium security, and included 5,336 individuals housed in 20 institutions. The institutions were categorized according to their physical design characteristics.

Analyses were conducted to understand the relationship and inter-relationship of both individual-level (e.g., demographic information, risk-related information) and institutional-level (e.g., institutional population information, institutional physical design category) variables with offenders' behaviour. Of particular interest were analyses focused on the following three areas: (1) being found guilty of institutional charges; (2) being placed in administrative segregation; and (3) being transferred to minimum security.

Even after accounting for demographic, offence, sentence, and risk-related information, institutional designation was found to be associated with all three outcomes. Offenders accommodated in institutions in the highest category (i.e., those using greater static security measures) were more likely to be found guilty of an institutional charge or to be placed in segregation, and were less likely to be transferred to a minimum security institution.

This study was the first of its kind conducted in Canada, and results were broadly similar to those in the American context. Overall, the accumulating evidence in the area consistently demonstrates that institutional environment is a key feature in understanding offender behaviour. However, a number of questions remain with respect to the mechanisms underlying the identified differences. First, the present analyses were not able to demonstrate specifically which design features were most important in explaining the findings. For example, research in other contexts has examined elements such as lighting and furnishing and their effects on behaviours and attitudes; this level of detailed understanding is not yet available in the penitentiary context. Second, it is not yet clear whether design features evoke positive behaviours, suppress negative ones, or both. Increased knowledge with respect to these mechanisms would be valuable in informing future design-related decisions.

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Introduction

Features of an environment, both physical and social, are known to influence the behaviour of those within it (e.g., Kweon, Ulrich, Walker, & Tassinari, 2008; Miwa & Hanyu, 2006). Not surprisingly, there has also been interest in how such features can be manipulated in order to bring about desired behaviours (e.g., Bell, Baum, Fisher, & Greene, 1990; Tzameret & Churchman, 1984). The effect of environmental features first received significant attention in the areas of educational and workplace environments (e.g., Baum & Komar, 1976; Sundstrom, Herbert, & Brown, 1982), but more recently, correctional environments have also been examined (e.g., Senese, 1997; Wener & Olsen, 1980). A variety of features of correctional facilities' environment have been identified as associated with both offender and staff behaviour. Most research in the area, however, has been conducted in the American context, and, frequently, without the benefit of the relatively sophisticated analytic approaches necessary to reflect the complexities of the phenomenon. For these reasons, it was deemed appropriate to undertake an examination of the influence of physical design within the Correctional Service of Canada's (CSC's) correctional institutions on offender behaviour.

Physical Design

Environmental features have been categorized as physical, reflecting aspects such as architecture, or as components of social climate. The two categorizations – physical design and social climate – are acknowledged to overlap; indeed, the structure of an environment may influence how individuals within it interact. Though some researchers have incorporated the two into a single dimension (e.g., Ross, Diamond, Liebling, & Saylor, 2008), Wright (1985) argues that they are related but distinct constructs, with social climate sometimes mediating the relationship between physical design and behaviour.

While the definition of physical design is straight-forward (e.g., architectural design, room layouts and size), the definition of social climate is somewhat less so and lacks consensus (Griffin, 1999; Guion, 1973; Wright, 1985). Generally speaking, social climate refers to factors relating to the individuals within and the culture of a particular environment, such as social density, racial diversity, or the group dynamics of those in the environment. A number of researchers have argued that perceptions of social climate are as important as more easily-

measurable features (e.g., Ross et al., 2008), though these are beyond the scope of the present research.¹

Behavioural Effects of Physical Design

Research has demonstrated that such physical factors as lighting, furnishings, and the presence of artwork can influence mood and behaviour (Bell et al., 1990). For example, the use of home-like (as opposed to office-like) furnishings can increase communication (Gifford, 1988), while the presence of artwork has been found to reduce feelings of anger and stress (Kweon et al., 2008). Physical attractiveness and cleanliness of schools has been found to increase involvement and decrease truancy (Kumar, O'Malley, & Johnston, 2008); in workspaces, lighting is related to job satisfaction (Veitch, Gerrits, Charles, Newsham, & Marquardt, 2005). These types of research findings can inform design and décor decisions so as to support desired behaviour. Indeed, design decisions may reflect the intended use of a space. For instance, brighter lights can increase communication among peers (Gifford, 1988), while in therapeutic environments, dim lighting is perceived as more pleasant, relaxing, calming, and as contributing to increased self-disclosure (Miwa & Hanyu, 2006).

Effects in the Correctional Environment

The literature on environment and behaviour takes on a special importance in the context of correctional institutions, given that inmates do not choose to be in the environment, they cannot leave, and the environment contains other individuals who may have a propensity for poor behavioural control. Research on the effects of design on behaviour in a general context suggests that it is likely that certain aspects of correctional environments could exacerbate problematic behaviour among inmates; however, it is likely also possible to identify features that have the potential to positively impact behaviour, thereby improving staff and offender safety.²

New generation facilities. Much of the research on the impact of correctional environments has been conducted in the United States and has focused on comparing traditional carceral facilities to so-called new generation facilities. These facilities, also known as direct supervision facilities, started to develop in the 1970s and are characterized by smaller, more

¹ A preliminary examination of the feasibility and utility of measuring perceptions of social climate in the correctional environment has been completed (Scott & Gobeil, manuscript submitted).

² Some research into the effects of design (and social climate) in correctional institutions has examined effects for both inmates and staff. However, examinations of staff were beyond the scope of this report.

podular living arrangements, typically with more home-like furnishings, than traditional facilities. In addition, new generation facilities are marked by a more dynamic philosophy regarding security and inmate management, whereby there is greater focus on ensuring safety through staff interactions with inmates rather than the use of static measures such as bars and gates (see Applegate & Paoline, 2007; Wener, Frazier, & Farbstein, 1985; Yocum, Anderson, Da Vigo, & Lee, 2006). In other words, traditional and new generation facilities differ in terms of both physical design and social climate features. Together, the physical and social climate features characterizing new generation institutions are intended to provide a more humane environment for inmates, while also promoting privacy, safety, and emphasizing the authority of the institutional staff (Applegate, Surrette, & McCarthy, 1999; Wener, 2006; Wener et al., 1985; Zupan & Stohr-Gillmore, 1988). It was expected that these features could improve both inmate and staff satisfaction with the environment, improve efficiency in managing the institutions, and reduce negative behaviour from inmates.

Research results have been mixed. While some authors have documented that inmates have reported lower levels of anxiety and stress (Wener & Olsen, 1980; Zupan & Stohr-Gillmore, 1988), others found no difference in self-reported levels of boredom, aggression, or stress (Yocum et al., 2006). Inmates have been found to have more positive attitudes towards correctional officers in new generation facilities (Yocum et al., 2006; Zupan & Stohr-Gillmore, 1988), which may be due to more frequent interaction between staff and inmates (Wener et al., 1985; Yocum et al., 2006).

Most researchers have also concluded that new generation facilities tend to have lower rates of institutional incidents. For example, Bayens, Williams, and Smykla (1997) found lower rates of inmate infractions in most categories examined in new generation facilities compared to traditional facilities. The most serious forms of infractions were dramatically reduced (e.g., assaults, sex offences, attempted suicides, fires, possession of weapons, escapes). Similarly, Senese (1997) found reductions in most rule violations (e.g., violence, contraband, property destruction) though not in threats, property theft, or inmate order problems. In a recent review of the literature on new generation facilities, Wener (2006) concluded that there was fairly consistent support for reductions in assaults and other serious institutional incidents in these institutions.

Relative Effects of Individual Differences and Institutional Characteristics

Though it is clear that physical features of institutions likely have some effect on inmate behaviour, the interpretation of this research is made challenging by the fact that other possibly influential factors are often not explored. There is evidence that many individual factors are also associated with institutional adjustment and behaviour, including risk level, age, substance abuse problems, criminal history, and criminal attitudes (Gendreau, Goggin, & Law, 1997). Overall, inmate behaviour is likely a result of a complex interaction of physical and social features of the environment with offender characteristics.

Understanding inmate behaviour should, therefore, consider both characteristics of the inmates and characteristics of the institutions (e.g., Saylor, 1984; Steiner, 2008; Wooldredge, Griffin, & Pratt, 2001). Unfortunately, most research has addressed only one area (Camp, Saylor, & Harer, 1997; Steiner & Wooldredge, 2008). Although ideal, multi-level examination of inmate behaviour poses analytical complications. Inmate characteristics and institution characteristics exist at different levels of analysis: some variables describe individuals whereas others describe institutions. One type of analysis, however, has come to be commonly used in this context: Hierarchical linear modeling (HLM; e.g., Raudenbush & Bryk, 2001) is designed to examine predictors at multiple levels (e.g., inmate-level and institution-level). HLM analyses can provide a unique understanding of the joint impact of individual variables and differences across institutions. Notably, however, the nature of HLM and other multi-level modelling approaches is that they allow for the examination of the impact of institution-level variables while also controlling for individual-level variables. Therefore, the interpretation of institution-level variables is always incremental (i.e., whether the physical design features are predictive of the outcome of interest after controlling for a variety of inmate characteristics).

A number of studies have used HLM and similar analytic approaches. Significant variability in rates of misconducts has been found across correctional institutions, even after controlling for inmate characteristics (e.g., Steiner & Wooldredge, 2008; Wooldredge et al., 2001). Studies have differed considerably in terms of the proportion of the variability in inmate behaviour attributable to institution-level (as opposed to individual-level) factors (Gillespie, 2005; Worrall & Morris, 2011), but have been consistent in finding that the institution level characteristics influence behaviour even after accounting for individual-level influences.

Studies have also differed in terms of the institution-level factors they have identified as

influential. For example, overall institution size has been found to sometimes – but not always – be related to misconduct, in some cases depending on the type of misconduct being considered (Gillepsie, 2005; Huebner, 2003; Jiang, Fisher-Giorlando, & Mo, 2005; Jiang & Winfree, 2006; Lahm, 2008). Several studies also examined characteristics of the inmate population. These studies generally entered the inmate features (e.g., age) at the individual level, but also tested the incremental predictive value of the average level of that variable across facilities (e.g., average inmate age at a particular correctional institution). For example, Lahm (2008) found that correctional facilities with more non-White inmates had higher rates of assaults on other inmates, though others (Jiang & Winfree, 2006) did not find such an effect. Steiner and Wooldredge (2008) found that the proportion of violent offenders predicted increases in misbehaviour. Others found that institutions with higher average risk scores had more violent and drug misconducts even after controlling for the individual risk level of the inmates (Camp, Gaes, Langan, & Saylor, 2003). Interestingly, Worrall and Morris (2011) found that the proportion of inmates involved in gangs and with prior misconducts was not related to any type of misconduct.

The Current Study

It is clear that physical features of an institution can influence inmate behaviour even after accounting for the influence of individual-level factors. However, almost all research in the area has been conducted in the United States. Given that the physical standards of construction, correctional philosophies, and inmate characteristics differ across correctional jurisdictions, the extent to which these findings are generalizable to the Canadian context is unclear and research conducted in this jurisdiction is necessary. This study was therefore undertaken to explore the possible role of physical design in understanding offenders' behaviour in Canadian federal institutions.

More specifically, this study's purpose was to examine the relationship and inter-relationship of institutional- and individual-level factors on offenders' institutional adjustment. As this was one of the first such studies in Canada, the study was limited to men offenders housed in medium security institutions. Analyses focused on physical design features while outcomes focused on three areas: (1) institutional charges; (2) periods of segregation; and (3) transfers to lower security.³

³ Analyses focused on incidents of victimization and on releases could not be pursued due to low frequencies.

Method

Participants

The study sample was comprised of men offenders who had remained within the same unit type within the same institution for the three-month period from March 1, 2011 to June 1, 2011. A total of 5,336 offenders met these criteria; this number represents about two-thirds of the population of offenders classified to medium security at the time. Offenders were distributed across 20 institutions, or, when units of different designations within institutions are considered, 25 units/institutions. As can be seen in Table 1, the distribution of offenders across regions roughly paralleled that of the federal offender population as of March 2011.

Table 1
Regional Distribution of Offenders

Group	Region				
	Atlantic	Quebec	Ontario	Prairie	Pacific
	%	%	%	%	%
Study sample	7.4	23.0	30.5	28.1	11.0
Offender population	9.3	22.7	28.9	25.9	13.2

Note. Offender population data obtained from CSC's Corporate Reporting System.

Just over one-in-five offenders in the study sample (21.4%) were Aboriginal, which is roughly in line with the corresponding figure for the CSC population as a whole (18.5%; Public Safety, 2011). Most offenders were single or widowed (51.2%), though over two-thirds (39.0%) were married or common-law. The remainder (9.8%) were divorced or separated. On average, offenders were 39.6 years old ($SD = 12.3$; range: 18 – 84).

Data

For each offender, a variety of data were drawn from the Offender Management System, CSC's computerized offender file system. Specifically, demographic data (e.g., age, marital status, race), offence and sentence data (e.g., sentence length, index offence), and risk data (e.g., static risk, dynamic risk) were all obtained. In addition, data were obtained on the offender's

behavior within the three-month study period, including whether he was found guilty of institutional charges or was admitted to segregation. Finally, data were obtained with respect to a number of indicators of perceived risk in the period after the three-month study period. All offenders were followed from June 1, 2011, the end of the study period, until March 1, 2012, to determine whether they were transferred to an institution of another security level. In addition to offender-level data, unit or institutional designation was also obtained.

Measures

Individual-Level Data

Measures of risk. A number of measures of risk were used in these analyses, all of which were originally completed in the context of the Offender Intake Assessment, a comprehensive assessment process completed by a parole officer upon an offender's admission (CSC, 2007a; 2007b). Four of these measures of risk – static risk, dynamic risk, motivation, and reintegration potential – are rated as low, moderate or high. Given their distributions, for the multi-level analyses, they were collapsed into two categories each. For static and dynamic risk, high ratings were compared to other ratings, whereas for motivation and reintegration potential, low ratings were compared to other ratings. Static risk represents a consideration of each offender's criminal history, sexual offending history, and offence characteristics. Dynamic risk reflects the level of intervention assessed to be required in considering seven specific areas: employment, marital/family, associates/social interactions, substance abuse, community functioning, personal/emotional orientation, and attitudes. Motivation is a reflection of the offender's motivation to address the areas outlined in his correctional plan. Finally, reintegration potential is initially computed automatically by the Offender Management System and incorporates static risk, dynamic risk (for Aboriginal offenders only), scores on a security classification measure (the Custody Rating Scale), and scores on a measure of risk of recidivism (the Statistical Information on Recidivism – Revised 1; for non-Aboriginal offenders only). All four of these measures can be updated periodically throughout an offender's sentence if his parole officer perceives that there has been a change. For the purposes of this study, the most recently occurring assessment in each area was retained.

Offender behaviour and outcomes. Behavioural outcomes were examined for the three-month period wherein offenders resided within a specific institution or unit and those occurring

after this initial period. Within the study period, data were drawn on institutional charges and periods of segregation. Institutional charges, when laid, are categorized as minor or serious according to their severity, and these categories were retained for analyses. Typical charges include theft, fighting, and using intoxicants. Finally, with respect to segregation, due to base rates, all types of administrative segregation (voluntary, involuntary) were considered together. These variables were rated dichotomously as present or not.

An additional outcome was measured after the three-month period: transfers to lower security. Offenders were followed from the end of the study period for eight months (until March 1, 2012) to identify this outcome.⁴ Transfers can occur for a number of reasons, including the presence of incompatible inmates or the need to be transferred to a psychiatric facility. Of interest in the present study, however, were transfers due to an offender's security reclassification. Specifically, if an offender was reclassified to a lower security level, he would be transferred to a minimum security institution. Given that reclassification decisions are based on changes in offenders' institutional adjustment, risk of escape, and risk to the public (CSC, 2010), these transfers are good proxies of assessed adjustment and risk.

Institutional-Level Variables

Institutional population variables. For the purposes of the multi-level models, the predictor variables for individuals – demographic, offence and sentence, and risk-related information – were also considered at the aggregate level. In other words, for continuous variables (age, sentence length, time served in the institution so far, proportion of sentence served), the mean value for each institution was calculated (in the case of sentence length, the value of 25 was input for any indeterminately-sentenced offenders). For categorical variables (Aboriginal ancestry, in a relationship, sentence type, and all four risk-related measures), a percentage was calculated.

Institutional designation. Given changes in design philosophies over time, CSC's institutions at any given security level are not all built identically. As such, in addition to each institution's security classification, a second designation also exists. This designation is associated with varying levels of security and supervision (CSC, 2012). For medium security institutions, four designations exist: security level 2, security level 3, security level 4, and

⁴ Only the first transfer within the period was considered in order to not introduce any confounds attributable to a different institutional designation at the institution to which the offender was transferred.

security level 5. Units and institutions of each type differ in a number of ways, including the living unit style (apartment style or cell block), the extent to which offenders' movement can be viewed and controlled, and the location and type of control post. The higher the designation, the greater the level of security and supervision.

Four medium security institutions (Springhill Institution, Fenbrook Institution, Collins Bay Institution, and Warkworth Institution) include units of different designations. All other medium security institutions are built to a single designation standard, with security level 5 units being the most common (65% of all medium security institutions have at least one unit, and often all units that meet the security level 5 designation). In addition, there is considerable regional variation in unit and institutional designations: Quebec region's medium security institutions all meet the security level 5 designation, while Ontario is the only region with medium security institutions at the security level 2 designation. Due to the low frequency of security level 2 designated institutions, for multi-level analyses, these institutions were grouped with ones designated as security level 3.

Analytic Approach

First, a series of descriptive analyses were conducted to describe the offenders' characteristics, the institutional-level variables, and offenders' behaviours and outcomes. Next, a series of chi-square tests of independence and one-way analyses of variance were used to examine associations between the offenders' characteristics and the institutional-level variable of unit or institutional designation. Finally, a series of multi-level models were constructed to examine the relative influence of offender characteristics and institutional-level variables in predicting offenders' behaviours and outcomes (see Raudenbush & Bryk, 2001). Preliminary tests demonstrated that there was significant variation in the model constants (y-intercepts) across units/institutions for each outcome, thereby justifying the use of multi-level models. Their construction involved fitting a sequential series of models and examining changes in model fit associated with each variable's addition to the model. Individual-level variables (known as level 1 variables) were modeled first, and once a stable model was identified for each outcome, the institutional-level variables (known as level 2 variables) were explored. The influence of institutional-level variables on both the model constants (intercepts) and the slope of the relationship of individual-level variables on outcomes (cross-level interactions) were examined.

In constructing models, each variable was centered around the mean of that level (i.e., the mean within each institution for the individual-level variables and the mean across institutions for the institutional-level variables) in order to avoid issues of collinearity between predictors across levels. However, given that uncentered variables are more intuitively understandable, once each final model was determined, an equivalent model with uncentered variables was also calculated. Where the uncentered version produced similar results, it was retained.

Results

Sample Description

Sentence and offence information. About three-quarters (76.6%; $n = 4,085$) of offenders in the sample were serving a determinate (i.e., fixed-length) sentence. For this group, the average sentence length was of 5.8 years ($SD = 5.3$ years). On average, these offenders had served just under half ($M = 44.3\%$; $SD = 22.8\%$) of their total sentence length so far at the start of the study period. Considering all offenders (determinately- and indeterminately-sentenced), on average, offenders had served 5.5 years ($SD = 8.0$ years) on their current sentence. In contrast, on average, they had served less than two-thirds of a year ($M = 226.3$ days; $SD = 383.7$ years) at the current institution. In comparison to the full population of offenders, this sample included a representative number of indeterminately-sentenced offenders (Public Safety, 2011), but the mean sentence length for those with determinate sentences was somewhat higher than what has been found elsewhere (Mullins, 2005, in Bottos, 2008; Motiuk, Cousineau, & Gileno, 2005).

Table 2 summarizes the most serious offence of which offenders were convicted on the current sentence. Overall, three-quarters of offenders (75.0%) were convicted of a violent offence, while the remainder were convicted of a non-violent offence. The most common offence was homicide or attempted homicide, followed by robbery and sexual offences. This pattern is consistent with expectations; given the longer sentences associated with these types of offences, offenders convicted of such offences accumulate in custody.

Table 2
Most Serious Offences

Offence Category	Offenders	
	%	(n)
Violent offences		
Homicide and attempted homicide	24.6	(1,277)
Sexual offences	16.2	(842)
Robbery	17.7	(921)
Assault	10.0	(520)
Other violent offences	6.5	(338)
Non-violent offences		
Drug offences	10.5	(543)
Property offences	9.6	(497)
Other non-violent offences	5.0	(257)

Note. N = 5,195. Offence data were missing for 141 offenders.

Risk. As can be seen in Table 3, offenders most frequently presented a moderate static risk and a high level of dynamic risk. Most were moderately motivated to engage in their correctional plan. Approximately equal percentages were assessed as having low and moderate reintegration potential.

Table 3
Risk Measure Ratings

Risk Measure	Low		Moderate		High	
	%	(n)	%	(n)	%	(n)
Static risk	31.5	(1,678)	63.3	(3,367)	5.2	(277)
Dynamic risk	2.6	(136)	28.5	(1,514)	69.0	(3,667)
Motivation	20.0	(1,062)	67.7	(3,596)	12.4	(659)
Reintegration potential	46.3	(2,459)	44.6	(2,369)	9.2	(489)

Note. N = 5,317-5,322. Data were missing for 19 offenders for all risk measures except static risk, which was missing for 14 offenders.

Institutional Designation

As expected based on the national distributions of institutions and units of each designation, the majority of offenders were accommodated in an institution or unit designated as security level 5 (57.3%; $n = 3,057$). About a quarter were at institutions designated as security level 4 (24.5%; $n = 1,307$) while relatively small amounts were at security level 3 (9.8%; $n = 522$) and security level 2 (8.4%; $n = 420$).

A series of analyses was conducted to determine whether the offenders in units and institutions of each designation differed in terms of their demographic characteristics, sentence, offences, and levels of risk (see Appendix). Though institution or unit designation was significantly associated with virtually all the examined characteristics, the nature of the association was not always clear. The large number of offenders available for inclusion in analyses meant even small differences were identified as statistically significant; not all, however, were significant in practical terms. Moreover, in some cases, patterns appeared to be at least somewhat confounded with regional differences in the offender population, given differences in the regional distribution of units and institutions of each designation. For example, units or institutions designated as security level 5 accommodated a disproportionate percentage of Aboriginal offenders; however, the Prairie region, which accommodates a large number of Aboriginal offenders, has predominantly institutions classified as security level 5. It was not possible to determine how much of this pattern was attributable to regional patterns; as such, the results presented in the Appendix should be interpreted with caution.

Offender Behavioural Outcomes

Behaviour within the study period. Offenders' files were verified for the presence of charges for which they were found guilty and placement in administrative segregation during the three-month study period. As can be seen in Table 5, about 13% of offenders were found guilty of at least one institutional charge. A smaller percentage of offenders were found guilty of serious charges than of minor charges. About three percent were placed in segregation during the study period, with almost all (91%) being placed in segregation involuntarily.

Table 4
Offender Behavioural Indicators during Study Period

Behaviour Indicator	Offenders	
	%	(n)
Institutional charge		
Minor	8.9	(475)
Serious	5.7	(303)
Any	13.4	(713)
Placement in segregation	3.0	(161)

Note. $N = 5,336$. Offenders can be represented in both the minor and serious institutional charge categories.

Behaviour following the study period. In the eight months following the study period, a total of 865 offenders were transferred from the institution where they were accommodated from March 1 to June 1, 2011. Of these 865 offenders, 44.3% ($n = 383$) were transferred to a minimum security institution and 21.6% ($n = 187$) were transferred to a maximum security institution. The others were either transferred to another medium security institution or to a multi-level institution such as a psychiatric centre. For subsequent analyses, the focus was on transfers to minimum security.

Multi-Level Modeling

In order to better understand the manner in which the offender-level variables (e.g., demographic, offence, sentence, risk information) and the institutional-level variables (e.g., aggregate-level information, unit or institutional designation) simultaneously shaped offender behaviour, a number of multi-level models were constructed.

Institutional charges. The first outcome modeled was being found guilty of an institutional charge in the six-month study period. Holding all other variables constant, at the individual level, a shorter period of time in the institution prior to the study period, a shorter aggregate sentence, and younger age were all associated with being found guilty of an institutional charge (see Table 5). In addition, however, institution or unit designation was also associated with being found guilty of a charge. Holding all other variables constant, as compared to offenders accommodated in a unit or institution designated as security level 2 or 3, those accommodated at security level 5 had 1.65 times greater odds of being found guilty of a

charge.

Table 5

Hierarchical Logistic Regression of Any Charge

Parameter	B	S.E.	t-ratio	Odds Ratio	95% C.I.	
					Lower	Upper
Constant	-0.23	0.23	-0.98	0.80	0.49	1.29
Individual-level						
Time in institution (in months)	-0.02	0.01	-2.80**	0.98	0.97	1.00
Age (in years)	-0.05	0.01	-11.0***	0.95	0.94	0.96
Aggregate sentence (in years)	-0.02	0.01	-2.71**	0.98	0.97	1.00
Institution-level						
Main effect (individual-level model y-intercept as outcome)						
Security level designation ^a						
Level 4	0.48	0.24	1.98	1.61	0.98	2.65
Level 5	0.50	0.21	2.40*	1.65	1.07	2.56

Note: $N_{\text{individuals}} = 5,336$. $N_{\text{units/institutions}} = 25$. ^aSecurity level 2 or 3 is the reference category. Population-average fixed effects model with uncentered variables reported.

** $p < .01$. *** $p < .001$.

When analyses were repeated separately for minor and serious charges, the results differed. In fact, unit or institutional designation was not a significant predictor of being found guilty of either of these types of charges when they were considered separately. For minor charges, holding other variables constant, a longer period in the institution, younger age, and Aboriginal ancestry were associated with a greater probability of being found guilty of a charge. Despite initial analyses suggesting multi-level modeling was required, no institutional-level variables were found to be associated with being found guilty of minor charges (see Table 6). This finding suggests that either a pertinent variable was not included in the model or that the institutions vary but that this variance is not systematic.

Table 6

Hierarchical Logistic Regression of Minor Charge

Parameter	B	S.E.	t-ratio	Odds Ratio	95% C.I.	
					Lower	Upper
Constant	-1.05	0.31	-3.35**	0.34	0.18	0.67
Individual-level						
Time in institution (in months)	-0.03	0.01	-3.58***	0.97	0.96	0.99
Age (in years)	-0.06	0.01	-10.77***	0.95	0.94	0.96
Aboriginal ancestry ^a	0.50	0.14	3.62***	1.66	1.26	2.18

Note: $N_{\text{individuals}} = 5,336$. $N_{\text{units/institutions}} = 25$. ^aNon-Aboriginal is the reference category. Population-average fixed effects model with uncentered variables reported.

** $p < .01$. *** $p < .001$.

Table 7

Hierarchical Logistic Regression of Serious Charge

Parameter	B	S.E.	t-ratio	Odds Ratio	95% C.I.	
					Lower	Upper
Constant	-3.23	0.14	-23.43***	0.04	0.03	0.05
Individual-level						
Age (in years)	-0.05	0.01	-8.79***	0.95	0.94	0.96
Dynamic risk ^a	0.41	0.14	2.94**	1.51	1.15	1.99
Institution-level						
Main effect (individual-level model y-intercept as outcome)						
Time served (in years)	-0.08	0.02	-3.37**	0.93	0.89	0.97
Static risk ^a	1.03	0.31	3.26**	2.79	1.45	5.36
Interaction effect (individual-level coefficients for age as outcome)						
Relationship status ^b	0.04	0.01	3.16**	1.04	0.02	1.07

Note: $N_{\text{individuals}} = 5,336$. $N_{\text{units/institutions}} = 25$. ^aGiven data limitations, dynamic risk and static risk were collapsed into two categories: high and not high (i.e., low or moderate). Not high is the reference category. ^bNot in a relationship (i.e., not married or common-law) is the reference category. Population-average fixed effects model with centered variables reported.

** $p < .01$. *** $p < .001$.

The model for serious incidents was relatively complex (see Table 7). Holding other variables constant, at the individual level, younger age and higher levels of dynamic risk were identified, while at the institution level, both shorter periods of time served so far on the sentence

and higher static risk were found to be associated with being found guilty of serious charges. In addition, a cross-level interaction of relationship status on the association of age with outcome was found. This result means that in units or institutions where a greater percentage of offenders were married, the relationship between older age and lower likelihood of being found guilty of a serious charge was stronger than in units or institutions where fewer offenders were married.

Considering minor and serious charges separately can be challenging as a result of the subjectivity and variability within and across institutions regarding the charges categorized as each (J. Rix, personal communication, May 8, 2013). This fact complicates interpretation of the results obtained for each model including charges. What is clear is that the likelihood of being found guilty of all types of charges differs by unit or institution, and that one possible explanation includes unit or institution designation.

Segregation. The multi-level model for placement in segregation was calculated next (see Table 8). Holding other variables constant, at the individual level, a longer period of time in the institution and a higher level of dynamic risk were associated with being segregated. At the institutional level, unit or institution designation was found to be statistically significant. In this case, those accommodated at security level 5 had 2.75 times greater odds of being segregated in the six month study period than did those accommodated at security level 2 or 3.

Table 8

Hierarchical Logistic Regression of Segregation

Parameter	B	S.E.	t-ratio	Odds Ratio	95% C.I.	
					Lower	Upper
Constant	-3.73	0.17	-22.30***	0.02	0.02	0.03
Individual-level						
Time in institution (in months)	-0.06	0.01	-4.40***	0.94	0.91	0.97
Dynamic risk ^a	0.43	0.19	2.26*	1.53	1.06	2.22
Institution-level						
Main effect (individual-level model y-intercept as outcome)						
Security level designation ^b						
Level 4	0.87	0.47	1.83	2.38	0.89	6.35
Level 5	1.01	0.42	2.40*	2.75	1.15	6.57

Note: $N_{\text{individuals}} = 5,336$. $N_{\text{units/institutions}} = 25$. ^aGiven data limitations, dynamic risk was collapsed into two categories: high and not high (i.e., low or moderate). Not high is the reference category. ^bSecurity level 2 or 3 is the reference category. Population-average fixed effects model with centered variables reported.

* $p < .05$. *** $p < .001$.

Transfer. Finally, the likelihood of being transferred to minimum security was modeled. Holding other variables constant, longer sentences and lower dynamic risk were associated with a greater likelihood of transfer at the individual level. At the institutional level, the main effect of unit or institutional designation was found to be significant. Overall, those accommodated at institutions designated as security level 4 or 5 were less likely than those accommodated at institutions designated as security level 2 or 3 to be transferred to a lower level of security. A cross-level interaction effect was also found. Specifically, holding all other variables constant, in units or institutions where a greater percentage of offenders were assessed as having moderate or high motivation, the relationship between longer sentences and greater likelihood of being transferred to minimum security was stronger than in units or institutions where fewer offenders were assessed as having moderate or high motivation.

Table 9

Hierarchical Logistic Regression of Transfer to Minimum Security

Parameter	B	S.E.	t-ratio	Odds Ratio	95% C.I.	
					Lower	Upper
Constant	-1.71	0.22	-7.65***	0.18	0.11	0.29
Individual-level						
Aggregate sentence (in years)	0.03	0.01	4.84***	1.03	0.02	1.04
Dynamic risk ^a	-0.68	0.11	6.14***	0.51	0.41	0.63
Institution-level						
Main effect (individual-level model y-intercept as outcome)						
Security level designation ^b						
Level 4	-1.00	0.31	-3.21**	0.37	0.19	0.70
Level 5	-0.82	0.26	3.14**	0.44	0.26	0.76
Interaction effect (individual-level coefficients for aggregate sentence as outcome)						
Motivation ^c	-0.03	0.01	-3.04**	0.97	0.95	0.99

Note: $N_{\text{individuals}} = 5,336$. $N_{\text{units/institutions}} = 25$. ^aGiven data limitations, dynamic risk was collapsed into two categories: high and not high (i.e., low or moderate). Not high is the reference category. ^bSecurity level 2 or 3 is the reference category. ^cMotivation was collapsed into low or not low (i.e., moderate or high). Not low is the reference category. Population-average fixed effects model with uncentered variables reported.

** $p < .01$. *** $p < .001$.

Discussion

This study aimed to examine whether an institution's designation – that is, the level of supervision and security associated with its physical design features – was associated with offenders' behaviour, after accounting for the influence of individual-level factors. It represented one of the first Canadian studies to examine the relationship and inter-relationship of institutional- and individual-level factors on offenders' institutional adjustment.

A preliminary examination (Gobeil, 2012) demonstrated that offenders housed at institutions with a higher designation were more likely to be found guilty of institutional charges or to be placed in involuntary administrative segregation. There was also an association between institutional designation and transfers to minimum security. However, these analyses did not account for any individual differences in the population of offenders accommodated at each type of institution.

The current study expanded on these earlier results by demonstrating that institutional design was associated with offender behaviour after accounting for individual differences. Even after accounting for demographic, offence, sentence, and risk-related information, institutional designation was found to be associated with being found guilty of an institutional charge, with being placed in administrative segregation, and with being transferred to minimum security. Relative to those accommodated at security level 2 or 3 (the two lowest levels for medium security), those accommodated at security level 5 (the highest level for medium security) had higher odds of being found guilty of a charge⁵ or of being segregated. Conversely, those at security level 2 or 3 had greater odds of being transferred to a minimum security institution than did their counterparts at security level 4 or 5.

Overall, the differences in offender behaviour across institutions, even after accounting for individual characteristics, were consistent with what has previously been found in studies focused on American carceral populations (e.g., Gillepsie, 2005; Steiner & Wooldredge, 2008; Wooldredge et al., 2001; Worrall & Morris, 2011). Specifically, in the U.S., offenders housed in new generation facilities have been found to have lower rates of institutional misbehavior than their counterparts housed in traditional facilities (Wener, 2006). The present results align with

⁵ Results were less clear, however, when minor and serious charges were considered separately.

this finding: lower-designation units or institutions resemble new generation facilities in terms of living arrangements and the relative role of dynamic and static security measures (see Yocum et al., 2006). Indeed, in this study, institutional designation was the most consistent institutional-level predictor, though other aggregate institutional-level measures of the institutional population were important in predicting specific outcomes (e.g., average time served so far, percentage of population with low motivation or with high static risk). Unit or institutional designation, however, denotes a constellation of factors. Though it is a measure of physical differences associated with security and supervision, those physical differences are necessarily associated with differences in the manner in which staff and offenders interact, and possibly with other differences. Just as has been the case for analyses comparing new generation and traditional institutions (Wener, 2006), it is impossible to determine which specific difference is most important in understanding offender behaviour. Research conducted in non-offender populations has found factors as simple as lighting and furnishings to be associated with behaviour (e.g., Bell et al., 1990; Gifford, 1988); this level of understanding with respect to institutional environments is not yet available. More specific and nuanced research would allow for a more complete understanding of the unique and combined influence of design and other environmental features associated with each institutional designation. Indeed, such research could also be helpful in understanding whether features associated with each designation contribute to encouraging positive behaviour, to encouraging problematic behaviour, or a combination of both. This information would obviously be key in informing any changes to physical design standards.

Limitations

Results must be interpreted in light of several limitations. First, the variables included in analyses were not exhaustive, and it is possible that if additional variables had been included, statistical models would have been different. Though the variables selected for inclusion were influenced by research, they were also influenced by data quality and data availability. For instance, no individual-level measure of substance dependence was included due to data quality issues. Notably, a number of the excluded variables (e.g., institutional crowding) have previously been found not to be associated with institutional behaviour (Worrall & Morris, 2011). Future researchers may nonetheless choose to expand on the variables considered in this study in their examinations. Also of note is that institutions of the various designations are not equally distributed across CSC's regions, and that regional-level variation may therefore have

contributed, to some extent, to the patterns of results.

Finally, in interpreting these findings, the direction of the relationship between institutional designation and the outcomes of interest must be considered. The present results demonstrate only that the designation of the institution wherein the offender is housed is associated with that offender being found guilty of charges, being segregated, or being transferred to a lower level of security. Despite the temporal sequence of events, the current results cannot demonstrate conclusively that a causal relationship exists. Given that individual-level variables were included in analyses, it is clear that it is not differences in offenders within institutions that are responsible for findings. In other words, the findings are not simply explained by staff members selecting appropriate offenders for units or institutions with lower designation. Nonetheless, it is possible that certain unmeasured variables influence both where offenders are placed and their subsequent behaviour and outcomes.

Conclusion

The physical design features associated with the level of security and supervision of medium-security institutions for federal men offenders were associated with the behaviour of those housed there. Overall, offenders housed in units or institutions of the highest designation showed worse institutional adjustment than their counterparts at lower designations. Multi-level modeling approaches confirmed that these patterns remained even after accounting for differences in the demographic, risk-related, and other features of offenders at each type of institution. This study was the first of its kind conducted in Canada, and results were broadly similar to those in the American context. Overall, the accumulating evidence in the area consistently demonstrates that institutional environment is a key feature in understanding offender behaviour. Future research may usefully be focused on how environmental features can be manipulated in order to encourage positive behaviours and outcomes.

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Appendices

Appendix A: Differences in Offender Demographic, Sentence, Offence, and Risk by Institutional Designation

Demographic Characteristics

Table A1

Distribution of Marital Status by Designation (%)

Marital Status	Unit or Institutional Designation			
	Security Level 2	Security Level 3	Security Level 4	Security Level 5
Married / common-law	36.7	39.0	35.4	40.9
Divorced / separated	14.8	12.0	12.0	7.7
Single / widowed	48.5	49.0	52.7	51.4

Note. Marital status unknown for 33 offenders. Distribution of marital status differed significantly by designation, $\chi^2(6, N = 5,303) = 45.24, p < .0001$.

Table A2

Percentage of Offenders of Aboriginal Ancestry by Designation (%)

Demographic Characteristic	Unit or Institutional Designation			
	Security Level 2	Security Level 3	Security Level 4	Security Level 5
Aboriginal Ancestry	12.5	21.0	17.8	65.7

Note. Ancestry unknown for 32 offenders. Percentage of offenders of Aboriginal ancestry differed significantly by designation, $\chi^2(3, N = 5,304) = 54.28, p < .0001$.

Table A3

Mean Offender Age by Designation

Demographic Characteristic	Unit or Institutional Designation			
	Security Level 2	Security Level 3	Security Level 4	Security Level 5
Age	43.4 _{abc}	39.5 _a	39.9 _{bd}	38.8 _{cd}

Note. Mean age differed significantly by designation, $F(3, 5,332) = 21.78, p < .0001$. Means that share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.

Sentence and Offence Information

Table A4

Percentage of Offenders with Determinate Sentences (%)

Sentence Characteristic	Unit or Institutional Designation			
	Security Level 2	Security Level 3	Security Level 4	Security Level 5
Determinate sentence	64.4	70.4	76.3	79.8

Note. Percentage of offenders with a determinate sentence differed significantly by designation, $\chi^2(3, N = 5,336) = 68.96, p < .0001$.

Table A5

Aggregate Sentence Length (in Years), Percentage of Aggregate Sentence Served, Time Served Since Admission, and Time Served at Current Institution by Designation

Sentence Characteristic	Unit or Institutional Designation			
	Security Level 2	Security Level 3	Security Level 4	Security Level 5
Sentence length (years)	6.1	6.0	5.3 _a	6.0 _a
Percentage of sentence served	43.4	45.4	43.9	44.3
Time since admission (years)	6.6 _{ab}	5.9	5.5 _a	5.3 _b
Time at current institution (months)	6.6 _a	9.8 _{ab}	8.0	7.0 _b

Note. Mean aggregate sentence length differed significantly by designation, $F(3, 4,081) = 4.34, p < .01$. Mean percentage of sentence served did not differ significantly by designation, $F(3, 4,081) = 0.48$. Mean time since admission differed significantly by designation, $F(3, 5,322) = 4.35, p < .01$. Mean time at current institution differed significantly by designation, $F(3, 5,322) = 7.97, p < .0001$. Means that share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison. Though it appears, for aggregate sentence length, that security level 4 should also differ from security levels 3 and 2, the smaller number of offenders at each of those levels prevented the pairwise differences involving those designations from reaching statistical significance.)

Table A6

Percentage of Offenders Convicted of a Violent Offence (%)

Sentence Characteristic	Unit or Institutional Designation			
	Security Level 2	Security Level 3	Security Level 4	Security Level 5
Determinate sentence	82.7	70.8	77.4	73.4

Note. Percentage of offenders convicted of a violent offence differed significantly by designation, $\chi^2(3, N = 5,195) = 28.05, p < .0001$.

Risk Information

Table A7

Percentage of Offenders with Each Risk Measure Rating (%)

Risk Measure	Unit or Institutional Designation			
	Security Level 2	Security Level 3	Security Level 4	Security Level 5
Static risk				
Low	30.8	35.0	28.0	32.6
Moderate	63.6	57.5	66.5	62.7
High	5.6	7.6	5.4	4.7
Dynamic risk				
Low	5.2	4.7	2.2	2.0
Moderate	37.2	36.1	27.3	26.4
High	57.7	59.2	70.6	71.7
Motivation				
Low	12.8	10.2	20.6	22.4
Moderate	69.9	71.1	66.5	67.2
High	17.2	18.7	12.9	10.4
Reintegration potential				
Low	42.2	36.1	48.2	47.6
Moderate	41.8	49.2	42.8	45.1
High	16.1	13.5	9.0	7.3
SIR-R1 group ^a				
Very good	47.7	36.3	29.3	28.7
Good	12.8	14.3	17.9	15.7
Fair	15.8	18.6	16.6	18.6
Fair / poor	9.7	12.0	14.6	14.6
Poor	14.1	18.9	21.7	22.3

^aPartially because it is not used with non-Aboriginal offenders, SIR-data were unavailable for 1,180 offenders.

Note. Distribution of static risk ratings differed significantly by designation, $\chi^2(6, N = 5,322) = 19.44, p < .01$.

Distribution of dynamic risk ratings differed significantly by designation, $\chi^2(6, N = 5,317) = 74.61, p < .0001$.

Distribution of motivation ratings differed significantly by designation, $\chi^2(6, N = 5,317) = 79.14, p < .0001$.

Distribution of reintegration potential ratings differed significantly by designation, $\chi^2(6, N = 5,317) = 72.14, p < .0001$.

Distribution of Statistical Information on Recidivism group membership differed significantly by designation, $\chi^2(12, N = 4,142) = 77.91, p < .0001$.