Contents lists available at ScienceDirect

Aggression and Violent Behavior

A framework for understanding sexual violence: Incentive-motivation and hierarchical control

Frederick Toates^{a,*}, Wineke Smid^b, Jan van den Berg^{b,c}

^a Department of Life Sciences, The Open University, Milton Keynes MK7 6AA, United Kingdom

^b Van der Hoeven Kliniek / De Forensische Zorgspecialisten, Willem Dreeslaan 2, 3515 GB Utrecht, The Netherlands

^c Institute for Family and Sexuality Studies, Department of Neurosciences, KU Leuven, Belgium

ARTICLE INFO

Article history:

Received 6 December 2015

Received in revised form 12 December 2016

Accepted 3 January 2017

Available online xxxx

Keywords:

Hierarchy

Motivation

Dopamine

Dominance

Rape

Inhibition

ABSTRACT

The article applies an incentive-motivation model to sexual violence. It suggests that insights can be gained by looking at the biopsychological processes that underlie 'conventional behavior'. It argues that sexual violence, as in rape, arises from a fusion between (i) sexual motivation and (ii) sensation-seeking and varying strengths of dominance/aggression motivations. The excitatory part of the motivational system is rooted in brain dopamine and sexual violence is expressed in behavior when excitation exceeds inhibition. The assumptions are framed within the principle of the hierarchical control of behavior. The incentive-motivation and hierarchical framework can yield insights into such phenomena as planning and impulsivity, future discounting, habituation and escalation, violence as addiction, the role of fetishes, sexual fantasy, stress, drugs and brain development.

© 2017 Published by Elsevier Ltd.

Contents

1.	Introduction	0
2.	Some existing theoretical models.	0
2.1.	The confluence model	0
2.2.	Dissecting different types of process	0
2.3.	An integrated theory of sexual offending	0
3.	General features of the processes underlying the control of behavior.	0
3.1.	The role of triggering stimuli	0
3.2.	Triggering by cognitions	0
3.3.	Hierarchical controls	0
3.4.	The role of arousal	0
3.5.	Excitation and inhibition	0
4.	The features of sexual motivation	0
4.1.	General principles	0
4.2.	Sexual fantasy	0
5.	The features of dominance.	0
5.1.	Basic principles	0
5.2.	Dominance as expressed through aggression	0
5.2.1.	Introduction.	0
5.2.2.	Motivational models of aggression.	0
5.2.3.	Hierarchical structure	0
5.2.4.	Triggers to aggression	0
6.	Sensation-seeking	0

* Corresponding author at: Department of Life Sciences, The Open University, Milton Keynes MK7 6AA, United Kingdom.

E-mail address: F.Toates@Open.ac.uk (F. Toates).

7.	Interactions between underlying factors	0
7.1.	General principles	0
8.	Cognitive processes	0
8.1.	Dominance and sexual desire: Underlying excitatory cognitions	0
8.2.	Deviant fantasy.	0
8.3.	The role of mitigating self-statements	0
8.4.	A causal role?	0
9.	The exertion of inhibition on violent behavior	0
10.	The role of dopamine in motivation	0
10.1.	General principle	0
10.2.	Dopamine and a common component underlying sex and dominance/aggression	0
10.3.	Psychopathy and dopaminergic activation	0
10.4.	Dopamine and cognition	0
11.	Developmental factors	0
11.1.	Social context	0
11.2.	Brain development	0
11.3.	A toxic association.	0
11.4.	Relabelling of the quality of arousal	0
11.5.	Learning by consequences	0
12.	Future discounting and incentive proximity.	0
12.1.	The phenomenon	0
12.2.	Brain processes	0
13.	Aversive emotions	0
14.	Habituation and escalation	0
15.	Fetishes and trophies.	0
16.	The cross-cultural dimension	0
17.	Link to drugs and addiction	0
17.1.	Effects of drug intake	0
17.2.	Sexual violence viewed as an addiction	0
18.	Discussion.	0
	References.	0

1. Introduction

Tragically, sexual violence remains a massive social problem with inestimable suffering to its victims. This paper represents an attempt to gain some new insight into this phenomenon by taking a particular motivational perspective. There can surely be no topic that triggers more deep-seated fear and disgust than this and so at the outset it is vital to state the position adopted here towards a number of closely-related issues:

1. Although the paper takes a biopsychological perspective, the fundamental role of the sociological input is fully accepted. It is simply that space precludes justice being done to this factor here.
2. There are frequent reminders within the growing child's social environment of male domination, e.g. domestic violence, child abuse, sexist language, certain films and violent pornography, and thereby of a link between dominance/violence and sexuality.
3. The most effective way of combating sexual violence would be to change the societal inputs to it.
4. Understanding of the motivational bases of sexual violence in no way excuses it. The individual must take responsibility.

In order to understand sexual violence and its motivational bases, various authors have suggested integrative perspectives (Arrigo & Purcell, 2001; Marshall & Barbaree, 1990; Silva, Ferrari, & Leong, 2002; Ward & Beech, 2006). However, such models have commonly made rather little reference to a contemporary understanding of motivation developed outside the area of sexual violence. In particular, the neuroscience of motivation has made massive advances in recent years but models of sexual violence have not kept up with this. For example, the central role of the brain neurochemical dopamine in motivation has been greatly clarified (Leyton & Vezina, 2014; Salamone, Correa, Farrar, & Mingote, 2007). The present paper does not represent an

attempt to supersede these earlier models. Rather, it considers what modern motivation theory and neuroscience can add to them.

Motivation theory suggests that a number of motivational processes can underlie pursuit of a given goal (Bindra, 1978; Toates, 2014). Applying this logic to sexual violence, contributions come from sexual desire, dominance including anger/aggression, and sensation-seeking (Ellis, 1989; Felson, 2002; Porter, Demetroff, & ten Brinke, 2010; Reid, Beauregard, Fedina, & Frith, 2014).

Rapists come in different forms with somewhat different underlying motivational bases (Knight, 1999; Porter et al., 2010). The relative proportions of these contributory factors can vary between individuals and probably over the experiences of a given sexual offender. The contribution of dominance/aggression appears to vary in strength considerably. At one extreme is, for example, the one-off date rapist, for whom violence is not an essential ingredient of sexual arousal and who uses violence, albeit callously, in an instrumental way. At the other extreme, is the individual whose sexual fantasies invariably involve violence and domination and who translates this into action. The paper will suggest a framework for understanding how these contributory factors can interact and thereby play a role in sexual violence.

It will be argued that at the basis of sexual violence is a 'motivational system' (Cf. Johnson, Leedom, & Muhtadie, 2012). As with harmless activities, this system organizes the selection and pursuit of goals and energizes the chosen behavior, while inhibiting competing activities. The present framework is based upon (i) incentive motivation, (ii) the hierarchical control of behavior and (iii) the existence of active excitation and inhibition.

Psychology and neuroscience have contributed insights into certain of the processes that appear to underlie violent sexual offending, e.g. dominance motivation (Fiske & Rai, 2014; Schultheiss & Brunstein, 2010), the neuroscience of anger (Carver, Johnson, & Joormann, 2008), weaknesses in the brain processes underlying restraint (Porter et al.,

2010), conflict between approach and avoidance (Ward & Hudson, 2000) and the effects of priming power motives on sexual attraction (Bargh, Raymond, Pryor, & Strack, 1995). However, these processes need some linking and integration in order to make progress towards a more comprehensive model.

First, it is necessary to introduce briefly some of the most relevant existing models and to indicate where a contemporary motivational framework can help to bind them together (the next section). Section 3 will then describe those general processes underlying the control of conventional behavior on which the present paper is based. The relevance of these processes to sexual violence will then be described.

2. Some existing theoretical models

2.1. The confluence model

Perhaps, the best-known is the confluence model, which suggests that, in sexually violent men, sexual motivation and dominance/aggression merge (Malamuth, Sockloskie, Koss, & Tanaka, 1991). Malamuth (1998, p.230) describes a developmental combination of “promiscuous/impersonal sex orientation” and “hostile, dominating personality features”.

In this tradition, Abbey, Jacques-Tiura, and LeBreton (2011) note that men who were victims of abuse in childhood are more likely to show adult sexual violence and they describe some contributory factors. The present paper will draw on material in the literature to illuminate how such sex-aggression fusion might be mediated.

2.2. Dissecting different types of process

Ward and Hudson (1998) describe two types of process underlying approach behavior, which they term ‘automatic’ and ‘explicit’, the latter involving careful planning. This distinction maps onto hierarchical models in neuroscience, which involve the brain embodiments of two different levels of control, described shortly.

Ward, Hudson, and Keenan (1998) note that sexual offending can be associated with both prior positive and negative affective states, and the discussion in the present paper will show how this assumption can be embodied in brain processes.

2.3. An integrated theory of sexual offending

Ward and Beech (2006) presented *An integrated theory of sexual offending* (ITSO), where they bring together the commonly discussed psychological, biological and cultural determinants. They note that offending is dependent upon individual and social/ environmental factors in interaction and the framework proposed here can suggest how such interaction is mediated. However, they suggested (p.45) that a neglect of “biological levels of analysis results in incomplete explanations of sexual offending...”, This is an omission that the present paper is designed to correct in part, while not underplaying the role of sociological factors.

These authors consider precipitating factors leading to offending, such as childhood abuse, empathy deficits, intoxication and stress, as well as the feedback effect of offending. In terms of neuroscience, the present paper will suggest how stress and intoxication can increase the tendency to offend, even in the face of good intentions (Sections 13 and 17). Ward and Beech note the toxic effect of chronic stress and abuse on brain structure and function and investigators now understand better how this arises (Section 3.3). The authors describe the role of some neurotransmitters. Dopamine is said to mediate “pleasure and reward” but our understanding has moved on from here, described later. Similarly, recent theory building allows a better understanding of serotonin within a hierarchical framework. Ward and Beech describe the importance of the fantasy that offenders employ but within the

ITSO there is no indication of how it could link to behavior. The present paper suggests how this might happen (Section 8.2).

3. General features of the processes underlying the control of behavior

3.1. The role of triggering stimuli

The principle of incentive motivation theory is that motivation can be aroused by particular incentive stimuli, the triggering capacity of which is modulated by internal states (Berridge, 2004; Bindra, 1978; Toates, 1986, 2009). As examples, the capacity of food to trigger feeding motivation is modulated by nutrient levels, while testosterone modulates the capacity of sexual stimuli to trigger sexual motivation. This incentive model was largely a reaction against older drive models, which involved a diffuse internal energizing factor (Berridge, 2004).

Evidence suggests that the physical presence of an incentive, say, food or a potential sexual partner, can strongly enhance the motivation directed towards that stimulus, a so-called ‘immediacy effect’ (McClure, Laibson, Loewenstein, & Cohen, 2004; Toates, 2014). In the context of sexual assault, the incentive role would be applicable at each point on the spectrum of planned-unplanned. Some sexual assaults involve careful planning, such as arranging a meeting and taking drugs specifically to administer to the intended victim. Others appear more spontaneous, when the rapist finds himself suddenly in the presence of an incentive and associated conditional stimuli. The latter case would more closely fit the pattern described by Ditto, Pizarro, Epstein, Jacobson, & MacDonald (2006, p.110), as involving “little conscious mediation or sense of having ‘decided’ to act.” This might be exemplified by unplanned sexual assaults done opportunistically, e.g. in the course of a house burglary (Hanson, 2000; Knight, 1999). However, a very important caution needs to be sounded at this point, as follows.

No matter what the motivational basis, whether planned or unplanned, sexual assault can never be interpreted as the victim’s fault. Even in the opportunistic case, there would need to be some prior predisposition (‘positive sensitivity’) to sexual violence for an assault to occur (i.e. ‘intentionality’ based in System 2). The role of incentives is, of course, not like that of stimuli in universally-present reflexes (e.g. pupil light reflex).

The principle of incentive motivation fits the influential theoretical development of Beck (1996). Following in the tradition of schemas, Beck proposes what he terms ‘modes’. A mode is an assembly of neural processes within the brain that is responsive to particular stimuli and which organizes coherent assemblies of cognition, memory revival, emotion, motivation and behavior. Modes offer economical and adaptive ways of solving problems that have been regularly encountered in evolution. For example, Beck describes a mode underlying hostility, which is triggered in threatening situations and is associated with the behavioral impulse to punish and the physiological reaction of sympathetic nervous system activation.

3.2. Triggering by cognitions

Motivation is also triggered by cognitive representations of incentives held in memory. Kavanagh et al. (2005, p.449) argued that desire-related imagery would “...assist in selection of behavioral alternatives and preferences of outcomes. Approaches to the target would both increase image vividness and increase the potency of associated affective responses.”

Neuroimaging shows that holding something in the imagination triggers activity in the same brain regions as are triggered by the actual presentation of the same thing. Desire-related thoughts can be triggered into conscious awareness by various means. These include the experience of negative affect (Bartels & Gannon, 2011). For sex offenders, an

important consequence of triggering in association with negative affect is the parallel triggering of plans for lowering affect by means of offending (Cortoni & Marshall, 2001).

3.3. Hierarchical controls

Behavior is organized by a hierarchical structure (Carver et al., 2008; Maclean, 1990). Brain processes that are old in evolutionary terms co-exist with the more recently evolved. Behavior is normally, if not always, a function of both systems acting together, though weight shifts between them. Rapid action, triggered by physically-present stimuli and requiring low processing demands, is organized by what is termed 'System 1', an 'on-line', 'automatic' and 'reflexive' system. Considerable responsibility for the triggering of behavior by physically-present stimuli rests upon sub-cortical brain processes of System 1, though the ventromedial prefrontal cortex is also involved. System 1 can operate at or below the level of conscious awareness (Langton, 2007). The incentive process described in Section 3.1 appears to act through System 1.

System 2 underlies the human capacity for complex and relatively slow, cognitive and conscious controlled reasoning and behavioral control, which can involve delaying gratification and exerting restraint on behavior (Langton, 2007; McClure et al., 2004). System 2 is described as 'reflective' and acting 'off-line', involving in particular the lateral and dorsal regions of the prefrontal cortex (Carver et al., 2008). System 2 involves executive control and goal-setting, the aspect of behavior termed 'purposive'. Its activity means that the organism is not simply under the control of external stimuli. Sexual offending is sometimes the outcome of such deliberate conscious planning (Ward & Hudson, 2000), though so is the goal of restraint.

Although distinct Systems 1 and 2 can be identified, they are interactive. System 2 sets the parameters of System 1, so, even when acting rapidly, behavior is not divorced from System 2 control. The two systems share some common components. An instance of goal-directed behavior would typically start with control by System 2, some weight moving to System 1 as the goal (if it is, say, a sexual incentive) is approached.

The distinction between System 1 and System 2 appears to correspond to implicit and explicit motivational factors respectively, as described by, for example, McClelland, Koestner, and Weinberger (1989) and Schultheiss and Brunstein (2010). Implicit motivations are those for power, achievement and affiliation. They organize the interaction with appropriate incentives but they are often impermeable to conscious introspection.

The closely-related notions of schemas (Gannon, Ward, Beech, & Fisher, 2007) and modes (Beck, 1996) (Section 3.1) contain the implicit assumption of a hierarchy of levels of organization. Thus, rational fully-conscious planning can occur. However, much of the processing of information, such as memory retrieval and organization of action, occurs outside conscious awareness. The product of this processing can appear in conscious awareness. Beck writes (p.6): "Although automatic, these motivational-behavioral patterns can be brought under conscious control in many instances." Beck continues (p.6) "The conscious control system is the instrument of the more reflective, deliberate, conscious, and less automatic desires goals and values...."

The tendencies arising within System 1 and System 2 can be compatible or in conflict, something very similar being described in the literature on offending (Drake & Ward, 2003). Both goals and incentives might be pulling the individual to engage in an activity, whereas at a time of resisting temptation, System 1 might be pulling towards the incentive while System 2 exerts restraint. The relative weight attributed to Systems 1 and 2, can change with a number of factors, as follows (Gannon et al., 2007; Toates, 1998, 2006, 2009, 2014):

Learning. Behavior can become semi-automatic ('on-line') with repeated experience. Well-practiced sequences are run-off semi-automatically with little conscious intention, increased weight being given to System 1 (though see earlier caution regarding responsibility).

Sensitivity of different brain regions. Relatively low activity of regions of the frontal lobes is associated with an impulsive and uninhibited pattern of behavior (Giancola, 2000; Sestir & Bartholow, 2007), described in the terms of the present paper as an increased weight given to System 1. Psychopathic behavior appears to be associated with deficiencies in the frontal lobes (Porter et al., 2010).

Chemical influences. Chemicals can change the weight of control between levels. For example, alcohol can increase the relative strength of on-line (System 1) controls (see Section 17.1).

Emotion and stress. Emotion/stress tends to cause a lowering of the role of high-level control and an increased weight of control to a lower level. Negative affect, exemplified by depression, can deplete off-line resources, thereby increasing the relative strength of control by on-line factors (Carver et al., 2008). Sexual arousal can increase impulsivity (Felson, 2002).

Development. With development, there is an increased weight of higher-level controls relative to those at a lower level (see Section 11.2). However, it appears that early social deprivation is associated with relative underdevelopment of those prefrontal brain regions that underlie off-line control.

3.4. The role of arousal

Some theorists see 'arousal' as central to understanding the control of behavior (Berridge & Arnsten, 2013; Ellis, 1989). It will be shown later where this notion helps us to understand the link between sex and violence. Arousal will be used to refer to a state of the brain linked to the autonomic nervous system, one of sympathetic dominance, in which the body is prepared for action, in the form of behavioral alerting, heightened heart-rate and blood pressure.

3.5. Excitation and inhibition

Behavior is under the control of both excitation and inhibition (Gray & McNaughton, 2000; Janssen & Bancroft, 2007). Thus, if behavior of a particular kind is not shown, this can be the result of a lack of excitation but can also be due to the presence of active inhibition.

As a possible feature of the biological basis, there is antagonism between dopaminergic (excitatory) and serotonergic (inhibitory) neural systems (Spoont, 1992). Carver et al. (2008, p.912) suggest that executive control processes can inhibit the activity of lower brain levels. A deficit in this role is indicated by low serotonin levels. Thus the person with low executive control and low activity of serotonin tends to be brought strongly under the control of "associative and affective cues of the moment." In male offenders, low serotonin levels are associated with higher levels of impulsive aggression. High serotonin levels are associated with restraint on behavior and taking long-term considerations into account.

4. The features of sexual motivation

4.1. General principles

Sexual motivation arises within a hierarchy of controls, from a combination of the effects of sexual stimuli and stored cognitions concerning sexual stimuli (e.g. fantasy). As part of the hierarchical organization, sexual stimuli as well as inhibitory events are processed both (i) rapidly and unconsciously and (ii) slowly and consciously (Spiering & Everaerd, 2007).

Whether sexual motivation engages sexual behavior depends upon excitatory and inhibitory factors (Janssen & Bancroft, 2007). Inhibitory factors arise from physically present stimuli (e.g. triggers to fear or disgust) and from cognitions (e.g. concern about the consequences of sexual transgression).

4.2. Sexual fantasy

The term 'sexual fantasy' refers to the conscious *elaboration* of desire-related imagery into scenarios. The initiating erotic images might (i) enter conscious awareness from the unconscious memory store 'intrusively', (ii) be deliberately instigated as a conscious choice or (iii) be triggered by external stimuli or sexual arousal. Testosterone increases the frequency of sexual fantasy (Leitenberg & Henning, 1995; Regan & Berscheid, 1999). Fantasy can involve re-running past experiences, reflecting upon possibilities and, perhaps of most concern to the present topic, planning future action.

Fantasy appears to be a particular example of a general process termed 'prospection' (Gilbert & Wilson, 2007): in the here-and-now, people can run simulations of the future and experience something of the expected hedonic value of the outcome. The prefrontal cortex and temporal lobes of the brain are activated at a time of such simulation and dopaminergic systems (described shortly) form an important basis of it. A common assumption is that a major contributor to human action is the estimation of the future hedonic consequence, positive or negative, of that action.

5. The features of dominance

5.1. Basic principles

Dominance and the assertion of authority commonly form part of the motivational basis of rape (Fiske & Rai, 2014). For some, sex without dominance might even feel inadequate or intimidating. For others, coercion appears to be used not because of any intrinsic motivational value but simply as something instrumental to gaining sexual access when other means fail (Felson, 2002), albeit with callous disregard for the victim. Dominance might be expressed in various ways (Johnson et al., 2012), e.g. grooming an individual for sexual activity. However, the focus of the present paper is upon the violent expression of dominance in rape, particularly serial rape.

The feminist perspective has traditionally been that rape is not about sex but power and domination (Thompson, 2009), whereas sociobiologists have emphasized sexual desire (Thornhill & Palmer, 2000). A compromise position is that both sexual desire and power motivation are ingredients of many cases of rape (Ellis, 1989; Felson, 2002).

Based upon reports of some incarcerated rapists, the desire to dominate and humiliate appears to play a part in their motivation (Darke, 1990; Jewkes, Sikweyiya, Morrell, & Dunkle, 2010; Mann & Hollin, 2010), in addition to sexual desire. Darke takes an extreme view, arguing that (p.58): "...all sexual assaults are perpetrated to satisfy the aggressor's desire for, and to enhance feelings of, power." For example, the thoughts and behavior of sexual murderers tend to be engaged with control and dominance (Arrigo & Purcell, 2001; MacCulloch, Snowden, Wood, & Mills, 1983).

Even where a power motive is not reported or even consciously experienced, it can exert an influence at an implicit level. Fodor (2010, p.3) writes:

"Need for power (*n* Power) is conceptualized as a desire to influence, control, or impress others and, as a corollary, to receive acclaim or at least recognition for these power-motivated behaviors. As a motive, it both energizes behavior and channels it toward objectives that fulfil the basic need."

The power motive causes an orientation of attention towards attainment of the incentive situation of exerting power over another. It is sensitized by testosterone and activates the sympathetic branch of the autonomic nervous system (Hall, Stanton, & Schultheiss, 2010). For males with high *n*-power, winning a contest increases their levels of testosterone (Schultheiss, Campbell, & McClelland, 1999). High *n*-power is associated with relatively low levels of empathy for the suffering of others (Van Kleef, Oveis, Van Der Löwe, LuoKogan, et al., 2008). Males with a high *n*-power score prefer partners who are high in dependence.

They have a high level of conflict in relationships, view women in hostile terms (Dutton & Strachan, 1987) and show a relatively high tendency to inflict violence upon their partners (Mason and Blankenship, 1987).

Investigators place considerable weight upon individual differences in implicit motives (Schultheiss & Brunstein, 2010; Zurbriggen, 2000). Although the research appears not to have been done yet, one might reasonably speculate that violent sexual offenders are high in the motivation for power and low in that for affiliation. In such terms, the behavioral expression of the assailant might be one of anger, while reward would come in signs of surprise, fear and submission in the victim (Schultheiss & Hale, 2007; Stanton, Hall, & Schultheiss, 2010), in addition to sexual reward. By Pavlovian conditioning, cues associated with the incentive of a suitable target acquire motivational value and can direct attention.

A comparison across species shows that not only are animals motivated to acquire control over a situation, but that such control brings benefits to them. For example, in a yoked-pairs design, the member of the pair of rats having control exhibits a lower reaction of the corticosteroid system and also lower degrees of gastric pathology (Weiss, 1971).

5.2. Dominance as expressed through aggression

5.2.1. Introduction

There are individual differences in the underlying emotional states that accompany sexual violence (Porter et al., 2010). Not all sexual assaults are associated with the emotion of anger, though many are (Felson, 2002).

5.2.2. Motivational models of aggression

The view that aggression has a cathartic effect is widespread, reflected in the assumption that it can be modelled by an accumulation of energy, which is discharged by performing aggression. The tendency then slowly increases, modelled by the restoration of energy level (reviewed by Vohs & Baumeister, 2008). Such expressions as "need to get it out of your system" and "vent your anger" reflect such an assumption.

In fact, the evidence is counter to this assumption; the performance of an act of aggression *increases* the future tendency to show aggression (Vohs & Baumeister, 2008). This could be described as a sensitization process, and thereby aggression shows features in common with such incentive motivational systems, as addictive drug-taking, feeding and sex (Carver & Harmon-Jones, 2009). Vohs and Baumeister give aggression as an example of the principle that "liking increases wanting" and argue (p.377) "When people feel angry or upset, they anticipate that aggressing will make them feel better, and so they aggress."

Performance of aggression is described as subjectively pleasurable (May, 2011). Where aggression has social consequences, this would fit the suggestion that positive affect arises "when progress is going well with regard to its intended endpoint" (Carver & Harmon-Jones, 2009, p.195).

There is evidence that, under some circumstances, viewing pornography, particularly of a violent kind, increases the tendency to show aggression (Donnerstein, 1983; Marshall & Barbaree, 1990; Murrin & Laws, 1990). Donnerstein concluded that when a male is angered before or after viewing powerful erotic stimuli, the viewing increases aggressive tendencies. This is what might be expected from the notion that different underlying factors can facilitate each other.

In common with other motivations associated with approach, anger-linked aggression is characterized by dominance of activity in the front of the *left* hemisphere. This is in contrast to fear which is characterized by dominance of activity in the front of the *right* hemisphere (Carver & Harmon-Jones, 2009). Left frontal dominance is seen in people angered and who have a perception of the possibility of taking action.

Anger acts as an input to the behavioral activating system, anger and aggression being sensitized by testosterone (Carver & Harmon-Jones,

2009). Relative to controls, the brains of men high on a scale of psychopathy have a relatively underactive right hemisphere (a structure which normally mediates pro-social tendencies) and a relatively overactive left hemisphere (mediating sensation-seeking, risk-taking and aggression) (Hecht, 2011). This imbalance contributes to impulsivity and disinhibition.

Which of the consequences of dominance/aggression strengthen the behavioral tendency? Under some circumstances and for some individuals, dominance/aggression can be reinforcing because of (i) its extrinsic (often, social) consequences, e.g. signs of fear, submission, gain of resources or escape from aversive conditions, change in sensory input (Schultheiss & Brunstein, 2010) and (ii) the intrinsic consequence of simply performing aggressive behavior, involving interoceptive (muscular) feedback (May, 2011).

Various non-human species can be taught an operant task for the opportunity to attack another animal (Cuppis & Kennedy, 2008; May, 2011). For some humans, aggression can also acquire an appetitive aspect, whereby situations are sought for their potential to facilitate expression of this behavior (May, 2011). The extent to which such appetitive seeking occurs might well depend upon early experience in terms of such factors as role modelling and reinforcement for displays of aggression (May, 2011).

5.2.3. Hierarchical structure

Anger/aggression fits hierarchical principles (The present discussion concerns only offensive and not defensive aggression). Hence, parallels can be drawn with sexual behavior. In terms of a hierarchy of controls, aggression has levels of both deliberate and conscious control as well as impulsive and semi-automatic control (Giancola, 2000), as reflected in the behavior of sexual offenders (Porter et al., 2010). The aggression literature recognizes a distinction between 'reactive' and 'proactive' aggression (Bluemke & Teige-Mocigemba, 2015). Reactive aggression would seem to be based upon System 1 control whereas proactive aggression would be based upon System 2 control.

5.2.4. Triggers to aggression

The triggers to aggression range from those involving little cognitive elaboration, such as a depressed mood, pain and excessive heat in the environment, to those involving assessments of the blameworthiness of a target (Berkowitz, 1993). An important trigger to aggression is the blocking of behavior directed towards a goal, usually termed 'frustration' (Carver & Harmon-Jones, 2009). In this case, anger instigates approach behavior in an attempt to remove the obstacle. Another trigger is offense at the perceived intentional behavior of another person, i.e. their blameworthiness. Anger that is triggered in this way links to aggressive behavior appropriate to restoring the situation to what is desired, e.g. by regaining the honour of the angered party, restoring control/dominance and/or the discomfort/humiliation of the offending party (Fiske & Rai, 2014).

As boys mature, so their physical aggression generally decreases in frequency (Nagin & Tremblay, 1999), suggesting a greater acquisition of restraint based upon maturation of System 2. At a young age, thwarted dominance is more likely to provoke aggression than is the case later when more socially-acceptable means emerge (Johnson et al., 2012). In the cases that are the focus here such increased restraint appears to be deficient, at least where it concerns sexual violence.

6. Sensation-seeking

Novelty-seeking is an intrinsic feature of the human condition, shared with other mammalian species. An extreme form of this is termed 'sensation-seeking' (Ellis, 1989) or 'thrill-seeking'. Porter et al. (2010) argue that sensation-seeking lies at the motivational basis of those high in psychopathy, who are particularly prone to boredom. Over time, this can motivate such men to change the type of their victim, e.g. from adults to children, in an attempt to maintain the novelty

value. It appears also to be implicated in the escalation of violence over years, culminating in some cases in sexual homicide.

7. Interactions between underlying factors

7.1. General principles

In addition to motivation-specific brain processes, evidence points to a common incentive approach system that serves the range of different motivations (Carver & Harmon-Jones, 2009; Toates, 1986). In gaining access to this system, there are interactions between motivational processes. So, for some people an attachment system might lock into interaction with sexual desire, such that priming the system of attachment facilitates, or is even a necessary requirement, for feeling sexual desire (Diamond, 2006).

In keeping with the notion of such an empathetic interaction is the observation that representations of consensual sexual activity trigger higher arousal in normal males than do representations of forced activity (Lalumière, Quinsey, Harris, Rice, & Trautrimas, 2003). It appears that empathy inhibits arousal in the forced situation (Malamuth, 1998). By contrast, in this sample, rapists reacted with similar levels of arousal to both types of representation.

Scales of sensation-seeking count the seeking of sexual variety as one possible contributory factor (Zuckerman, 1990), pointing to the merging of sexual desire and sensation-seeking. Sexually-coercive males have a strong attraction to novelty-seeking even in their consensual sexual desire (Lalumière, Chalmers, Quinsey, & Seto, 1996).

For those individuals of concern here, the sexual attraction felt towards another appears can be amplified by a dominance/aggression system (Doidge, 2007). Males with a high *n*-power score tend to start sexual activity early and have relatively many partners (Winter, 1973) and show relatively high levels of sexual activity (Schultheiss, Dargel, & Rohde, 2003).

8. Cognitive processes

8.1. Dominance and sexual desire: Underlying excitatory cognitions

For males having the desire to dominate, the subliminal priming of dominance-related words tends to increase female attractiveness (Bargh et al., 1995). Word pairs involving sexual and power words were presented to males and their memory of these combinations compared to the memory of control words (Pryor & Stoller, 1994). Males with a high likelihood of showing sexual harassment had a tendency to overestimate the frequency of presentation of power-sex combinations. They showed a high confidence in their recognition of the power-sex combinations they had seen, as compared to the confidence of men with a low tendency to harass. The authors concluded that, for such males (p.167):

"...sexuality and dominance are closely related concepts..."

In one study, men with a tendency to sexual coercion were found to have a high power motivation. Participants were presented with cue words associated with power in order to test whether this made sex-linked words more easily accessible, a $P \rightarrow S$ link (Zurbriggen, 2000). An interaction was found in that the combination of high power motivation and strong $P \rightarrow S$ links was particularly good as a predictor of tendencies to sexual coercion and aggression.

The central claim of the present paper is that such fusion between sex and dominance/aggression is central to understanding much sexual violence (Ellis, 1989). Reciprocally, it is suggested that, under some circumstances, the strength of aggression towards a particular target can be increased by a simultaneously present sexual motivation.

8.2. Deviant fantasy

Serial sexual offenders commonly engage in violent fantasy (MacCulloch, Gray, & Watt, 2000), involving both re-runs of the past and future planning (Bartels & Gannon, 2011; Schlesinger, 2007). On the occasions that incarcerated rapists perform masturbation, they commonly entertain deviant fantasy (McKibben, Proulx, & Lusignan, 1994). Offenders often report an extensive period of fantasy prior to offending and between offences, commonly associated with viewing violent pornography. The results of early 'try-outs' or 'successful accomplishments' can be incorporated into the fantasy. The content of the fantasy often corresponds to the actual behavior of the offender (Woodworth et al., 2013).

It has been suggested that fantasy exhibits some of the same principles of organization as behavior, in particular operant conditioning (MacCulloch et al., 2000). Reinforcement would come in the form of the exertion of control and resolution of the narrative. If the fantasy is accompanied by masturbation, in some cases also with viewing pornography, this could be a further source of reinforcement (MacCulloch et al., 1983). Negative reinforcement would be evident when the fantasy is triggered at times of distress caused by, say, criticism or rejection.

8.3. The role of mitigating self-statements

Self-statements can lower the impact of any possible restraints. Self-statements are, of course, not peculiar to sexual offenders. Rather, most people probably employ them in order to engage in activities that go against their explicit goals (De Ridder, de Witt Huberts, & Evers, 2015). For example, a dieter will make a self-statement of the kind "it is only this once and I have shown so much restraint of late." There is much research on the role of self-statements in giving in to temptation that might usefully be adapted to the case of those sex offenders who are in a similar state of ambivalence. According to de Ridder et al., self-statements exemplify that the reflective system is not invariably something that opposes the impulsive system. Rather, their effect can be to act in the same direction as the impulsive system.

The literature on over-arching schemas (Thakker, Ward, & Navathe, 2007) and implicit theories (Fisher & Beech, 2007) describes several classes of mitigating self-statements that are employed by rapists. Each of these classes suggests a means by which inhibition on performing sexual violence can be reduced:

1. Grievance. The belief that the rapist had suffered injustice.
2. Self-pity. Associated with feelings of hopelessness.
3. Control. Success comes through the exertion of dominance over others.
4. Entitlement. A right to satisfy wishes, without regard for others.
5. Disrespect. Some classes of women, e.g. sex workers, deserve to be raped.
6. Women have a constant need for sex, even though they might not acknowledge this.
7. The male sex drive is uncontrollable.

These might or might not be consciously accessed at any given time. Items 4 and 5 clearly relate to dominance, while 6 and 7 are compatible with this over-arching motivation. This fits with the observation that 'virtuous' cognitions of dominance and exerting authority permeate the mind of many rapists (Fiske & Rai, 2014). These statements fit the category termed 'exculpatory', described next.

8.4. A causal role?

For sexual offending, does fantasy increase the chances of enacting its content in behavior? Alternatively, by providing an accompaniment to masturbation, might fantasy act as a safety valve?

Is fantasy an ineffective side-issue having no causal role in the motivational dynamics (an 'epiphenomenon') or does fantasy change the brain in such a way as to increase the likelihood of enactment? A 'successful resolution' of the narrative could act to increase the future frequency of such fantasy, i.e. positive reinforcement (Carabellese, Maniglio, Greco, & Catanesi, 2011).

It is frequently suggested that fantasy could play a causal role in sexual offending¹ (Myers, Burgess, & Nelson, 1998; Ward & Hudson, 2000; Woodworth et al., 2013) and there is evidence that conscious desires are not epiphenomena but play a role in action (Andrade, May, van Dillen, & Kavanagh, 2015). For obvious reasons, the evidence on offending is indirect and experimentation can only be based upon consensual activities. However, controlled studies suggest that imagining oneself to be doing something increases the later chances of doing it. For example, imagining oneself to be voting increases the chances of actually voting (Libby, Shaffer, Eibach, & Slemmer, 2007). Practice in the imagination is reflected in later improved skill acquisition (Baumeister, Masicampo, & Vohs, 2011).

Some research into the dynamics of cognitive processes (Westen, Blagov, Harenski, Kilts, & Hamann, 2006) could prove relevant. Though it was carried out in the context of politics, it might reasonably be extrapolated to the link between sexual fantasy and motivation. The term 'motivated reasoning' refers to the fact that reasoning is guided not just by rational principles but by the outcomes of the reasoning. So, in making a judgement on, say, a statement by a political candidate, a person's judgement would be guided by both a rational analysis of the statement's content but also by how comfortable the individual is with the outcome (again suggesting layered control).

Suppose that a person hears a statement that is at odds with his/her convictions. This appears to prompt a search for a so-called exculpatory ('get-out clause') cognition that lowers the intensity of the negative emotion. People with politically partisan views were presented with the sequence (i) an utterance by their favoured candidate, (ii) an apparently contradictory utterance and (iii) an exculpatory statement (i.e. a statement that would be expected to lower the disparity felt on exposure to statements (i) and (ii)).²

In the present context, a rapist might lower the disparity between two statements such as "the victim was traumatized" and "I am innocent" by a counter statement of the kind "women who wear short skirts are asking for it". Evidence discussed shortly (Section 10.4) suggests that the exculpatory statement neutralizes the negative statement and reinforces the positive assertion.

9. The exertion of inhibition on violent behavior

Where sexual violence is concerned, there are a number of potential sources of inhibition on behavior (Porter et al., 2010). One such is fear, either in the present or in the future anticipation of consequences, such as capture or injury. One can speculate that inhibition need not be specific to sexual violence but rather is a process of restraint against any behavior with long-term negative consequences. Thus, it would appear relevant that boys who commit sexual assault are likely also to commit non-sexual criminal offences (Felson, 2002).

For violent sexual behavior, empathy is a highly relevant factor since there is invariably a suffering victim. Sexual offenders differ in the extent to which they feel any empathy for their victims (Felson, 2002). Rapists are typically low on empathy (Lisak & Ivan, 1995). Men high on psychopathy, by definition, typically feel little or no empathy or conscience (Porter et al., 2010) and hence an important inhibitory factor is absent.

¹ Or that it at least gives an index of aggressive intentions (Malamuth, 1998).

² Typically, the first statement might be that the "President expressed his total faith in Mr. X", the second and contradictory statement might be "Now that Mr. X has been shown to be a crook, the President keeps quiet about him" and the exculpatory statement could be "The President is silent because he feels shocked and betrayed".

10. The role of dopamine in motivation

10.1. General principle

Dopamine (DA) acts both cortically and sub-cortically, i.e. at more than one level in the hierarchy. The subcortical dopaminergic pathway that runs from the ventral tegmental area (VTA) to the nucleus accumbens (N.acc.) is activated by appetitive stimuli (Young, Ahier, Upton, Joseph, & Gray, 1998). It constitutes a general approach pathway (Leyton and Vezina, 2014) and this section looks at the significance of the pathway for understanding interactions between sexual desire, sensation-seeking and dominance/aggression/anger. This pathway appears to underlie power seeking (Hall et al., 2010; Johnson et al., 2012). For appetitive events, it underlies the wanting and approach aspect of behavior (Leyton and Vezina, 2014; Robinson & Berridge, 1993). The artificial boosting of dopamine levels at the time of imagining a stimulus enhances the assessment of the hedonic state to be experienced in future interaction with that stimulus (Sharot, Shiner, Brown, Fan, & Dolan, 2009).

Experiments on rats have shown that engaging in various forms of appetitive behavior, e.g. sexual behavior or that rewarded with drug-infusion, activates dopamine release in the N.acc. (van Erp & Miczek, 2000). Presentation of a receptive female to a male rat elevates dopamine release in the N.acc. (Damsma, Pfaus, Wenkstern, Phillips, & Fibiger, 1992). Dopaminergic systems react most strongly in a situation associated with reward but where there is an element of uncertainty about the availability of reward (Fiorillo, Tobler, & Schultz, 2003). In sexual offending, considerable uncertainty must often be present. A hallmark of sensation-seeking must surely be the uncertainty of the outcome. The term 'Coolidge effect' refers to the arousal of sexual desire by novelty. A novel partner tends to arouse dopaminergic activity particularly strongly (Fiorino, Coury, & Phillips, 1997).

10.2. Dopamine and a common component underlying sex and dominance/aggression

Performing aggression triggers the release of dopamine in the nucleus accumbens and a rise in heart-rate (Ferrari, van Erp, Tornatzky, & Miczek, 2003; May, 2011). Elevated dopamine levels persist beyond the period of the aggression. After repeated aggressive encounters, the anticipation of such an encounter also triggers dopamine release, evidence of classical conditioning.

The increased DA activity in the N.acc. that is seen in an aggressive encounter is similar to that triggered by positive incentives such as food or sexual stimuli, or associated conditional stimuli, pointing to common features shared with unambiguously appetitive activities. Corresponding to the increased dopaminergic activity at the N.acc., a decrease in serotonergic activity is seen. Ferrari et al. suggested that this reaction reflects coordination of behavioral and autonomic systems in preparation for action. When dopamine antagonists are administered, there is a lowering of the operant rate shown by mice rewarded with an aggressive opportunity (Couppis & Kennedy, 2008). According to Denson et al., (2015, p.372): "Neuroimaging research highlights the fact that brain regions implicated in reward may play a critical role in the extent to which aggressive desires influence cognition and behavior."

10.3. Psychopathy and dopaminergic activation

When the move towards an incentive is thwarted and anger triggered, there can be increased activation of the incentive system (Patterson & Newman, 1993). This is presumably a frequently-encountered event for potential and actual sexual offenders.

There is a positive correlation between scores on a scale of psychopathy and activation of dopaminergic systems caused by the prospect of reward (Bjork, Chen, & Hommer, 2012; Buckholz et al., 2010). Those high on a psychopathy score are characterized by a particularly strong attraction to incentives and low restraint when in the presence of an

incentive (Carver, 2005; Carver et al., 2008; Derryberry & Rothbart, 1997). The region of anterior medial prefrontal cortex showing the correlation is one that encodes the value of rewards such as food. There is a negative relationship between (i) serotonergic activity and (ii) psychopathy score and impulsive aggression.

10.4. Dopamine and cognition

For a non-offending population, reading pleasant stories, as distinct from unpleasant or neutral stories, activates dopamine and the appetitive brain regions, the nucleus accumbens and medial prefrontal cortex (Costa, Lang, Sabatinelli, Versace, & Bradley, 2010). Craving of drugs such as cocaine is associated with activation of the nucleus accumbens amongst other regions, the same as those excited by the sight of drugs (Kilts, Gross, Ely, & Drexler, 2004). This suggests the possibility of overflow from fantasy to reality, in that excitation of these brain regions triggered during sexual fantasy would make an approach towards actual sexual incentives more likely. This observation also raises the possibility that repeated excitation of these particular brain regions by fantasy could sensitize them so that they have increased responsiveness to actual sexual stimuli. This could make subsequent approach to these incentives more likely.

Neuroimaging was employed to observe the brain's activity during this exposure to conflicting statements, described in Section 8.4. Presentation of the exculpatory statement and thereby resolution of the conflict was associated with activation of the ventral striatum, a region containing the nucleus accumbens. Exculpatory statements are commonly employed by sex offenders, both in their intrinsic mental functioning and exchanged with other offenders.

The researchers suggested that, since this brain region is activated by conventional rewards, such as food, the resolution seen in the study also constituted a form of reward. In parallel, a lowering of activity in brain regions associated with negative emotion³ was seen, giving thereby, as the researchers argued, double reinforcement. One can speculate that this reinforcement will increase the power of such exculpatory statements to trigger this reward process in the future and increase their power.

A 'successful' resolution of the narrative involved in sexual fantasy might strengthen reward pathways and increase the chances of the fantasy being enacted in reality. This assumption runs implicitly through the literature on forensic psychology and herein lies a possible biological basis for the process.

The paper turns now to a consideration of how these systems came into being and how this is relevant to sexual offending.

11. Developmental factors

In trying to understand the emergence of aberrant sexual desire, it is insightful to consider the development of the physical structures of the brain, as well as the role of learning and emotion. This section addresses these topics.

11.1. Social context

Being in a violent household can facilitate the role-modelling of violence as a legitimate means to obtain desired ends (Marshall & Barbaree, 1990). Concerning individuals suffering from adverse upbringing, e.g. abuse and harsh punishment, Ward and Beech (2006, p.44) suggest that adolescence is especially difficult. In this period, they are "...most receptive to acquiring enduring sexual scripts, preferences, interests and attitudes." The accompanying burst in the secretion of sex hormones enhances the salience of these sexual cues.

Under adverse conditions, if the development is such that inadequate top-down control is present, this would leave excitatory System

³ Insula and lateral orbital cortex

1 unchecked with a possible window of vulnerability. The early life of sexual offenders is commonly characterized by social isolation and difficulties in establishing social relationships (Grubin, 1994; MacCulloch et al., 1983). Given their often chaotic and abusive background (Marshall & Barbaree, 1990), there is a relatively high chance that sexual desire will not emerge in a way that is linked to attachment and empathy. Failures in the development of attachment and empathy are implicated in later sexual offending (Proeve, 2003), seen here as loss of potential inhibitors. Of course, not all people of this background become sexual offenders, so another factor(s) is also involved.

Winter (1973) considers developmental history in terms of acquisition of power motivation (p.157):

"Social learning theory suggests a simple mechanism for the learning of positive (approach) power motives: the more early power behavior which is rewarded, the stronger will be later power-seeking."

In adolescence and later, peer groups such as college fraternities, gang membership and the military are known to be able to play a role in facilitating sexual violence (Tharp et al., 2013). A study of the brain might help to understand this (next section).

11.2. Brain development

A relatively recently evolved region of the brain, the prefrontal cortex, is also the latest to develop. In the early years, development of the subcortical brain regions that underlie motivation is complete but relatively unchecked by the still immature higher-level controls (Chein, Albert, O'Brien, Uckert, & Steinberg, 2011). This is associated with reckless behavior and, it might reasonably be extrapolated, for sexually-aggressive individuals, the establishment of their trajectory. In one sample, the teenage years were when most rapists committed their first rape (Jewkes et al., 2010).

Peers can facilitate various forms of adolescent risk taking by role modelling (Chein et al., 2011). A biological embodiment of this is increased activity in the incentive motivation pathway triggered by incentives when in the presence of peers.

11.3. A toxic association

Power-sex links are not universal across males (Zurbriggen, 2000).

Inhibitory controls might be expected to arise from role modelling of empathetic relationships. Such an early social context is typically not present in the families of boys who go on to become rapists (Marshall & Barbaree, 1990). If the early social context is one of hostility and harsh inconsistent punishment, a sex-aggression association might then form.

For sexual offenders, MacCulloch et al. (2000) suggest that the process of sensory preconditioning is involved in the formation of the toxic association between sex and aggression. The term 'sensory preconditioning' refers to where two stimuli are processed simultaneously and thereby an association between them is formed, summarized as 'cells that fire together wire together'. MacCulloch et al. speculate that, in the case of sexually sadistic men, during childhood, there is a pairing of representations of (i) internal negative bodily states, typically anger, and (ii) sexual arousal. Subsequently, triggering either representation triggers the other.

The process of sensory preconditioning and the fact that more than one motivation can underlie approach to a given incentive are relevant to the discussion on whether rape is more motivated by sex or dominance/aggression. According to the present argument, this sets up a false dichotomy since both contributions can be present (Cf. Symons, 1979, p.278). It is possible that over time more weight might attach to one or other factor, depending upon fluctuating levels of anger or sexual desire. The brains of different individuals might attribute varying weights to one or other component (Loewenstein, Nagin, & Paternoster, 1997).

Dopamine appears to be involved in sensory preconditioning. In an experiment by Young et al. (1998), first two neutral stimuli (a tone and a light) were paired. Later one of these (T1) is associated with shock and triggers conditioned suppression, as does the stimulus (T2), earlier paired with T1. During paired presentation of T1 and T2, a doubling of dopamine level in the nucleus accumbens was observed. No such increase was seen in a control group exposed to unpaired presentation of these stimuli. Applying this to the present topic, because of the dopaminergic connection, sensory preconditioning could underlie the attribution of motivational significance to the paired events of (i) some kind of aversive experience and (ii) emerging sexual desire.

11.4. Relabelling of the quality of arousal

Although necessarily somewhat anecdotal, evidence suggests the existence of a process that has the following characteristics (McGuire, Carlisle, & Young, 1965). An aversive stimulus is encountered in childhood, prior to sexual maturation. This triggers arousal and an emotional state such as fear or anger. Some time (possibly, years later accompanying sexual maturation), the originally aversive stimulus now takes on a positive quality and features of it are actively sought (Cf. Bem, 1996). A variety of non-sexual events, such as fear, can trigger erection in young boys (Ramsey, 1943). The situation could then become a candidate to be labelled as sexual.

This can be exemplified by two instances of men who were seen by women to be urinating in public when they were young, which triggered embarrassment (McGuire et al., 1965). However, later they became exhibitionists.

The Victorian sexologist, Havelock Ellis witnessed his mother urinating in public, which embarrassed him but later female urination became a fetish (Brome, 1979). The Swiss philosopher Jean-Jacques Rousseau described how the administration of corporal punishment by his government got transformed later into something to be sought and used as a prop for his sexual fantasies (Rousseau, 1781/1953). Adult sexual abusers sometimes repeat the abuse that they experienced in childhood (Eldridge & Saradjian, 2000). In one case, a boy was frightened by a popping balloon but later found the blowing up of balloons to be an erotic turn-on. He was arrested in a store after asking a female assistant to blow-up a balloon while he masturbated to the sight (Abel, Coffey, & Osborn, 2008).

Such phenomena appear to have much in common with, and might even share the same mechanism as, 'trauma-induced bonding and dependency' (Ellis, 1989), by which trauma victims often develop attachment to the individual responsible for their trauma. These effects require plasticity in the underlying neural processes and indeed animal studies point to just such plasticity in the nucleus accumbens (Kringelbach & Berridge, 2015).

11.5. Learning by consequences

Once a man engages in sexual violence and this is 'successful', it can be speculated that strong reinforcement would arise such as to increase the probability of repeating the behavior. The power-sex link might thereby be strengthened (Zurbriggen, 2000).

12. Future discounting and incentive proximity

12.1. The phenomenon

The principles of behavioral economics have been applied to sexual offending (Laws, 2003). In such terms, offenders are viewed as exerting effort to obtain short-term rewards (sexual contact), while devaluing rewards that can only be gained in the longer term (e.g. a secure life with employment), suggestive of domination by System 1. This is described as 'impulsivity', 'future discounting' or 'temporal discounting' (Laws, 2003; McClure et al., 2004), and corresponds roughly to what

some call 'self-defeating behavior' (Twenge, 2008). The sacrificing of short-term goals in the interests of longer-term gain is said to require 'self-control' or 'self-regulation', defined as (Twenge, 2008):

"...the human capacity to alter or override natural responses, including thoughts, emotions, and actions."

The capacity for self-regulation can become depleted with use, rather as a muscle becomes fatigued (Muraven & Baumeister, 2000).

There is a positive association between (i) high-risk drug-related and/or sexual behavior and (ii) the tendency to discount the future (Robbins & Bryan, 2004). Emotional states can change the magnitude of temporal discounting. For example, where heroin or money is the reward, a drug addict will discount the future more when craving the drug than when satiated by means of an opioid agonist (McClure et al., 2004). It seems reasonable to extrapolate to the present topic that a state of high anger and/or sexual arousal will similarly elevate levels of future discounting. The future reward that is discounted would be one of safety from harm and capture. As one offender described it, arousal made him act "like a robot" against his intentions to resist (Drake & Ward, 2003, p.239) (though see also qualifications to such claims in Sections 3.1 and 18.0). Most date rapes occur at a time of heightened sexual arousal following a consensual phase of sexual activity (Felson, 2002).

Unplanned assaults occur opportunistically when a 'suitable' victim happens to be encountered (Schlesinger, 2007). According to the present analysis, there would be an increase in motivation triggered by the physical presence of the victim.

Some sex offenders are not impulsive. Rather they show meticulous planning and restraint in their offending (Raine, 2013). As a very general principle, we might assume that individuals can be located somewhere on a continuum of System 1–System 2 weighting of behavior, with (as noted in Section 3.3) location changing with various circumstances. Young offenders tend to be located towards the disorganized offending end of the scale. The model would suggest that this is due to the relatively earlier maturation of the brain processes embodying System 1, as compared to the later maturing System 2 processes.

To some extent, sexual offenders are able to tune their offending to circumstances, i.e. taking cost into account. They sometimes refrain from offending when there is a high risk of capture (Marshall & Barbaree, 1990), a cost-benefit analysis. In one sample of rapists, children were selected as victims since the expectation was that there would be no negative consequences to the offender (Jewkes et al., 2010).

12.2. Brain processes

Brain scans of people showing either an immediate or a delayed choice can be made and activity in different brain regions measured. There is a network of interacting brain regions, including the anterior cingulate cortex and the lateral prefrontal cortex, which calculate the cost-benefit of an action (Denson et al., 2015). The dopaminergic system extending from the midbrain to the ventral striatum, medial orbitofrontal cortex and medial prefrontal cortex is activated particularly during a choice of immediacy.

The lateral prefrontal cortex and parietal cortex show a roughly similar activation whatever the delay (McClure et al., 2004). Presumably, these (System 2) structures are involved in assessing the value of a delayed reward and instigating inhibition upon the tendency to react impulsively. There is a link between damage to prefrontal regions and a tendency to capture by strong physically-present stimuli and excessive delay discounting (Luria, 1966).

McClure et al. argue (p.506):

"Our results help to explain why many factors other than temporal proximity, such as the sight or smell or touch of a desired object, are associated with impulsive behavior. If impatient behavior is driven by limbic activation, it follows that any factor that produces such activation may have effects similar to that of immediacy."

Cost-benefit analysis can be modelled in rats by looking at their willingness to overcome barriers to obtain large rewards, as opposed to

gaining immediate but lower value rewards by exerting minimal effort. Such willingness is a function of the activity of dopamine in the nucleus accumbens (Salamone et al., 2007).

13. Aversive emotions

For some violent offenders, times of negative mood, such as anger and depression, are associated with increased deviant fantasy and masturbation (Johnson & Becker, 1997; McKibben et al., 1994). Sex offenders commonly report being in a state of anger, stress and anxiety at the time of their offenses (Jewkes et al., 2010; Marshall & Barbaree, 1990). Boredom was a very common mood in one sample. Sexual attacks are commonly preceded by an incident of negative emotion, such as a row with a girl-friend or work-related trouble (Berry-Dee, 2003; Chan & Heide, 2009; Douglas & Olshaker, 2006; Schlesinger, 2001). A desire to exert punishment on either the victim or someone associated is present in a large percentage of cases (Jewkes et al., 2010), which would fit the general principle of a desire for retribution that underlies much violence (Fiske & Rai, 2014).

It appears that stress can shift the weight of control from System 2 to System 1, making the individual more responsive to immediate gratification and less sensitive to long-term consequences (Carver et al., 2008). Both depression and impulsive aggression are the result of a shift to control by a more automatic system associated with low serotonin levels.

The capacity for self-regulation is compromised by social rejection, for example, as in a romantic break-up (Twenge, 2008). Social exclusion appears to lead to a more automatic mode of control (though, it needs emphasizing, not a *lack* of control), characterized as a shift to System 1. Socially-excluded people are more likely to quit in the face of difficulty rather than to show persistence, to procrastinate, to go for high-risk options and to be distracted from a task of work or study (Twenge, 2008). Twenge suggests that social exclusion leads to a ".....deconstructed state, which includes a loss of future orientation and a failure of rational, meaningful thought..." Evidence suggests that the state is one which motivates an escape from self-awareness. The tendency to perform aggressive behavior is increased by social exclusion.

Applying a stressor of short-duration to rats, e.g. a brief shock to the tail or tail-pinch, causes a triggering of appetitive behavior, such as feeding or mating (see MacCulloch et al., 2000). Under certain conditions, stress can boost dopamine release at the N. acc. and cause behavioral activation, accompanied by long-term sensitization of the dopaminergic pathway (Cabib & Puglisi-Allegra, 2012; Robinson & Berridge, 1993). Such dopaminergic activation is shown in animals that have some control over the shock duration (e.g. by lever-pressing) but not in yoked controls exposed to the same shock but in the absence of any control. Thereby, stress in rodents can be seen to have certain features in common with human drug dependence. Stress triggers the release of a neurohormone, CRF, which has the effect of increasing the salience of incentives (Peciña, Schulkin, & Berridge, 2006).

14. Habituation and escalation

Over time, as offenses become less rewarding, so some offenders tend to escalate their frequency or intensity (Arrigo & Purcell, 2001; Carabellese et al., 2011). Fantasy similarly tends to decline in intensity, which can be the trigger to alter its content (MacCulloch et al., 1983) or introduce 'try-outs' (components of the fantasy, such as stalking) in reality (MacCulloch et al., 2000). The actual try-out can subsequently be incorporated into the fantasy narrative. Of course, many people have sexual fantasies but this does not create the pressure to escalate them in frequency or intensity. There must be something special about those violent offenders who do act in this way. A high frequency of associated masturbation might be a contributory factor. This phenomenon suggests the existence, not only of an incentive system, but

also a process of monitoring behavioral outcomes and a comparison of past experiences with current levels of actual and anticipated 'highs'.

15. Fetishes and trophies

Unusual sexual preferences appear to be acquired in some cases by the formation of a link between bodily arousal and a candidate stimulus that happens to be around at the time that the arousal is experienced (Section 11.4). The arousal might be caused by an aversive event and yet it becomes labelled as sexual by its pairing with a candidate stimulus.

For some individuals, fetishes and voyeurism seem to provide a kind of career introduction and progression into violent sexual crime. Arrigo and Purcell (2001, p.22) suggest that fetishes "...are introduced at some point in the context of social isolation and fantasy."

Might there be animal models of fetishes? A bird model of their acquisition was presented by Köksal et al. (2004). Male birds were given access to females preceded by presentation of a cloth form. Only a percentage of the sample attempted to interact with the cloth form, behavior that was resistant to extinction. Some human sexual fetishes might be acquired by a similar process of classical conditioning between copulation and arbitrary objects paired with this. However, it is more likely that fetishes are acquired not by pairing with sexual activity but by the pairing of arousal with, say, the sight of women and a focus upon, for example, shoes and feet, a form of sexual imprinting (Archer, 1992). This would most likely be the case where they are acquired by children prior to any sexual activity.

Lomanowska, Lovic, Rankine, et al. (2011) paired the appearance of a lever in a box with the presentation of food to hungry rats. The food was freely given and so the animals had no need to engage with the lever. None-the-less, some animals engaged vigorously with it, attributing, as the authors expressed it, abnormally high levels of incentive salience to this cue which had been paired with reward. Dopamine was activated in those rats that showed this response. Socially-deprived rats showed a particularly strong tendency to form such 'fetishes', suggesting a shift of weight to sub-cortical control and a possible model of the effects of social deprivation in humans. Of course, many people acquire fetishes but without any association with dominance/aggression.

16. The cross-cultural dimension

Although the suggested model is rooted in psychology and biology, to be truly integrative it needs to address the role of sociological and cultural factors in sexual violence and the interface between them. Rape frequency varies greatly across societies (Sanday, 1981), so sociocultural context is a powerful determinant. This fits a model in which behavioral tendency is determined by a balance between incentive and inhibitory factors, both of which involve information assimilated from the environment.

So, why are some cultures prone to sexual violence, whereas others are not? As a general principle, societies exhibiting a macho culture, male toughness and dominance, and an acceptance of violence (Sanday, 1981), including media depictions of rewarded violence (Marshall & Barbaree, 1990), are particularly prone to rape. Those characterized by equality between the sexes and a lack of interpersonal violence are relatively rape-free.

Anticipated consequences of rape also are reflected in its frequency across cultures. Sanday (p. 15) characterizes a society that is prone to rape as "... one in which sexual assault by men of women is either culturally allowable or, largely overlooked." At the individual level, this suggests a cost-benefit calculation (Section 12.2).

Rape is commonly an activity not by just a single male but by 2 or more men acting as a team, in some cultures as part of a ceremonial ritual (Sanday, 1981). It is known that sexual harassment is contagious and shows the influence of powerful role models (Bargh et al., 1995). Mirror neurons (Rizzolatti & Sinigaglia, 2008), a type that are active

on both performing an action and observing someone else to be performing it, could form a possible biological basis of such imitation.

Rape is particularly common in war-time (Marshall & Barbaree, 1990) and several factors are likely to contribute to this. There is camaraderie between soldiers in battle (Fiske & Rai, 2014). Research on functional neuroimaging has shown that parts of the brain underlying an empathy circuit are selectively sensitive to the perceived deservedness of the recipient (Decety & Ickes, 2011). So, the women of an enemy country are likely to be dehumanized and candidates for sexual assault. In addition, a cost-benefit analysis is likely to yield little cost in the sense of the likelihood of capture and punishment.

17. Link to drugs and addiction

The topic of addiction to either drugs or non-drugs impinges upon the present study in several ways. First, there are interactions between the intake of some drugs and sexual violence (Reid et al., 2014). Second, similar underlying predispositions and dynamics could be associated with both phenomena. For example, reference is sometimes made to the similarities and overlap between drug addiction and serial sexual violence (Laws, 2003), including homicide (Arrigo & Purcell, 2001). In the light of the argument presented here, serial sexual violence could itself be an example of an addiction. The caution expressed earlier needs to be reiterated at this point: the addicted person is not powerless in the face of the addiction. That is to say, the application of the description 'addiction' provides no excuse for the behavior (Vohs & Baumeister, 2009).

17.1. Effects of drug intake

Certain drugs can have both acute and chronic effects on the brain that are relevant to violence. With excessive alcohol consumption, evidence points to damage to the prefrontal cortex (Oscar-Berman & Marinković, 2007), which might impair the restraint function normally served by System 2. Many sexual offenses commonly follow the ingestion of alcohol or other psychoactive substances (Kraanen & Emmelkamp, 2011; Marshall & Barbaree, 1990). Apart from possible structural changes to the brain, drugs also have reversible effects. Alcohol has various effects that make sexual assault more likely (Abbey, Wegner, Woerner, Pegram, & Pierce, 2014). Of most relevance to the present argument, it increases the strength of control by physically present stimuli (System 1) relative to off-line controls (System 2), termed 'alcohol myopia' (Steele & Josephs, 1990). Thereby, the control of behavior is biased towards immediate salient stimuli, while the power of working memory, competitive goal-direction and associated inhibition is lowered (Abbey et al., 2014). Amongst men already of violent disposition, alcohol can interact with other influences and tip the scales in favour of offending (Testa, 2004). Thus, Abbey et al. (2011) incorporate the role of alcohol into the confluence model.

McClelland and Wilsnack (1972) observed that large amounts of alcohol increase the salience of power-related cues and lower inhibitions. For men with a high power motivation, Fodor (2010, p.11) concluded the following. As alcohol intake increases up to an upper limit, its effect is that: "...the mind becomes suffused with a less inhibited type of thinking about personal dominance, notably about aggression and exploitative sex."

17.2. Sexual violence viewed as an addiction

Laws (2003) argues that 'addiction' is a useful expression to apply to sexual violence and, if the model advanced here is correct, strong similarities with well-recognized addictions might be expected.

At center-stage in contemporary theorizing about addiction is the incentive salience model (Robinson & Berridge, 1993), which suggests that repeated encounters with drugs sensitize a dopamine-based wanting system. Evidence from rats points to a similar

sensitization arising from sexual activity (Pfaus, 2009). In humans, non-drug-based addictions, such as sex (Sunderwirth & Milkman, 1991; Voon et al., 2014) and gambling (Steeves et al., 2009), also suggest sensitization with experience. Parallel to the increased sensitivity shown to the addictive activity, other incentives trigger a decreased reaction (Leyton & Vezina, 2014). Coercive sexual offending, exemplified in the most extreme form of serial lust killing, shows some striking similarities with drug addictions, as well as sexual addiction (Pithers, Marques, Gibat, & Marlatt, 1983), which points to some common underlying features:

1. In drug addiction and sexual offending, short-term gain outweighs longer-term rewards, exemplifying increased System 1 control, sometimes termed 'impulse control' (Laws, 2003). However, both drug taking and sexual offending can be the result of conscious planning (Ward & Hudson, 2000), i.e. System 2 control.
2. A transient lift in emotional state is commonly experienced on engaging in an addictive activity (Black, Kehrberg, Flumerfelt, & Schlosser, 1997; Maltz & Maltz, 2010; Stein, Black, Shapira, & Spitzer, 2001) or in sexual violence, including sexual homicide (Arrigo & Purcell, 2001), often followed by extensive and delayed aversive consequences (Laws, Hudson, & Ward, 2000).
3. Alcohol and illegal drugs often lock into an excitatory interaction with sexual addiction (Washton & Stone-Washton, 1993) and anecdotal reports suggest a similar excessive consumption can be associated with sexual offending (Abbey et al., 2014; Vronsky, 2004).
4. A negative emotion is commonly experienced prior to relapse (Grant, Potenza, Weinstein, & Gorelick, 2010). The violent offender and the sexually-addicted person (as with the paedophile) might only avoid relapse by careful planning so as not to get into high-risk situations (Hudson & Ward, 2000). A high-risk situation for relapse is thought to be proximity to the tempting stimulus (Hanson, 2000; Laws et al., 2000), expressed as domination of control by System 1.
5. A particular and ideal incentive is often pursued diligently in sex addiction, e.g. pornographic films (reviewed by Toates, 2014) and sexual homicide (Miller, 2014).
6. At a time of stress, there is an increased probability of engaging in non-violent addictive activities (Kafka, 2000; Robinson & Berridge, 1993; Schneider & Weiss, 2001) and sexual violence (Wolf, 1989), suggesting increased control by System 1. In drug addiction (Sinha, 2001), sex addiction (Giugliano, 2008) and sexual homicide (Carlisle, 1998; Holmes, 1998; Myers, Reccoppa, Burton, & McElroy, 1993; Schlesinger, 2007), stress and tension are experienced when there is deprivation from a suitable outlet or a necessity to resist temptation. Intense stress in childhood commonly sets the scene for serial sexual killing (reviewed by Toates, 2014) and in a number of cases of sexual addiction (Turner, 2008).
7. In drug addiction, sexual addiction (Chaney & Chang, 2005; Doidge, 2007; Maltz & Maltz, 2010; Moskowitz & Roloff, 2007) and sexual violence/killing (Carabellese et al., 2011), habituation and tolerance occur over repeated experiences, so that either a higher chemical dose or an increased external stimulation is sought in order to maintain or increase the effect.
8. Neither sexual addiction (Schneider & Weiss, 2001; Wiederman, 2004) nor sexual offending (reviewed by Toates, 2014) is necessarily a response to deprivation of a conventional sexual outlet, e.g. regular girl friend or wife.
9. Drug and sexual addictions (Giugliano, 2008) and serial killing are associated with withdrawal symptoms.
10. The term 'craving' applies to addictions of various sorts (Kavanagh et al., 2005) and sexual homicide (Arrigo & Purcell, 2001).
11. In sexual addiction and serial killing (Arrigo & Purcell, 2001; Ressler, Burgess, & Douglas, 1992), there is sometimes a use of props such as items of erotic underwear. Fetishist souvenirs in the form of items of underwear or photos of victims feature large in the lives of a number of 'celebrity sex-linked serial killers', e.g. Dennis Rader, Russell Williams and Paul Bernardo (Miller, 2014).
12. A changed state of conscious awareness, sometimes termed 'dissociation' is found in sexual addiction (Bancroft & Vukadinovic, 2004), described as if watching someone else (Black et al., 1997) and reported in sexual homicide (Carlisle, 1998). Addicts often *feel* themselves to be out-of-control (Eisenman, Dantzer, & Ellis, 2004), though in reality they have not become automatons.
13. Both sexual addiction and sexual homicide are mainly a male activity (Silvio, McCloskey, & Ramos-Grenier, 2006), though, of course, both sexes acquire chemical addictions.
14. By definition, there is not a one-to-one reciprocal attachment with the object of desire in either sexual addiction or sex-linked serial killing.
15. Both violent sexual activity (Johnson & Becker, 1997; Silva et al., 2002) and sexual addiction (Kafka & Prentky, 1992) are commonly associated with masturbation. It seems reasonable to suppose that this shapes the development of behavior and periods of 'time-out' can be made more tolerable in this way. Fantasy, pornography and masturbation facilitate plans and action.
16. In drug addiction (Robinson & Berridge, 1993), sexual violence (Marques, Nelson, Alarcon, & Day, 2000; Porter et al., 2010) and serial killing, a long period of abstinence (e.g. as a result of incarceration) can be followed immediately by a resumption ('relapse') of activity. This is exemplified by Ted Bundy (Vronsky, 2004).
17. Social dislocation and alienation commonly set the scene for both drug addiction (Alexander, 2008) and serial sexual homicide (Vronsky, 2004).
18. Drug addiction, sexual addiction (Giugliano, 2008; Ryan, 1995) and sexual offending (Hudson & Ward, 2000) are commonly associated with ambivalence between engaging in the activity and showing restraint.

In addition to these similarities, there appears to be an addictive feature that helps to reinforce sexual violence: getting away with it, which could enhance feelings of superiority and dominance. The serial killer Keith Hunter Jespersen (USA) described this as being like the shoplifter who gets out of the store unchallenged (Redstall, 2011).

18. Discussion

The paper has suggested where incentive motivation theory and hierarchical control can help to develop integrative models of sexual violence. It argued that sexual violence is the output of a motivational system in which sexual desire can interact with dominance/aggression and sensation-seeking. The argument advanced is entirely compatible with a sociological perspective, in which the toxic effect of living a society that displays violence is modelled by the developing male.

Alas the argument involved rather broad brush-strokes, presenting a generic picture, while space precludes a nuanced approach to the various types of offender (Knight, 1999). The analysis perhaps applies most obviously to young offenders who go on to extreme violence.

The paper touches a most fundamental issue in understanding human behavior: are humans, as Ward and Brown (2003, p.342) claimed:

".....inherently active, self-directed organisms who are naturally predisposed to seek autonomy, relatedness and competence (basic human needs)?"

Or are they caused to act by stimuli in the environment? The present article suggests that there are features of both of these factors present. Thus, behavior is never completely independent from System 2 control and hence the offender cannot plead 'automaticity of reaction'.

The central argument is that the vast literature on motivation based upon both human and non-humans can usefully be exploited for the

study of sexual offending. In other words, we do not need to postulate a unique set of underlying processes. Rather, a combination of processes that is evident from a range of studies on innocuous behavior is implicated. For example, motivation of various, if not all, kinds is based in part upon an incentive motivational pathway that employs the neurochemical dopamine (Leyton and Vezina, 2014; Robinson & Berridge, 1993).

Why do some men rape and then stop after one offense, whereas others escalate to become serial rapists or even serial sex-linked killers? Based upon the analysis advanced here, variations in any of a number of parameters could be involved in establishing the balance between excitatory and inhibitory factors. Condemnation from members of the community, remorse, arrest or at least the fear of capture are present in some cases post-offense (Jewkes et al., 2010) and are therefore likely to be implicated in the subsequent exertion of inhibition. A large percentage of adolescent offenders appear to offend only once (Jones, 2003), which might be partly explained in terms of maturation of the brain processes underlying System 2 and its capacity to restrain System 1. However, it is reasonable to suppose that escape from detection and any incentive sensitization associated with re-runs in fantasy will act in the direction of increasing the future tendency to sexual violence.

Can the framework advanced here lead to advice on how to prevent sexual violence? Does it fit with any therapeutic techniques? At the least, recognition of multiple layers of control is relevant to therapy. As Drake and Ward (2003, p. 241) express it:

“It makes little sense to treat “expert” offenders (i.e., those with explicit goals and planning) in the same manner as the inadequate and impulsive ones...”

On the exertion of conscious control, Beck (1996, p.7) writes: “This system is involved in setting controls on the primal systems, by, for example, correcting the “automatic thoughts” emanating from the primal cognitive system...[...]a major function is gaining perspective over the basic cognitive reactions.”

For offenders, or potential offenders, who are ambivalent between offending and restraint, the attention of therapists might usefully be drawn to the exertion of inhibition. This can be envisaged as arising off-line as part of System 2 and based largely upon cognitions stored in memory (e.g. long-term consequences of reoffending) rather than physically-present stimuli. In such terms, the therapeutic task would consist of attempting to increase the strength of control by System 2. Therapy could involve trying to emphasize long-term socially acceptable goals (Laws, 2003), something that could exploit the insights derived from treating drug addiction (Andrade et al., 2015). This task might be assisted by reference to strengthening what is usually termed ‘executive control’, as in ADHD (Berridge & Arnsten, 2013). Exercise procedures are available for strengthening control by the prefrontal cortex (Lopez, Wagner, & Heatherton, 2015).

Considering the role of dopamine in drug addiction, it appears that sensitization can last for years after the last time the drug was taken (Robinson & Berridge, 1993). If this applies also to sexual violence, it suggests that life-long vigilance is indicated. It is tempting to suggest use of dopamine-blocking drugs. Alas, given that dopamine is central to any motivation, such drugs might prove to be an instrument that is too blunt. Invention of a drug that could selectively target the access of violence-based thoughts and goals to the general dopamine pathway might offer hope. Dopamine sensitization means that wanting can increase without a parallel increase in liking (Robinson & Berridge, 1993). It might be useful in therapy to point out that the strength of urges to offend might not be matched by a corresponding degree of pleasure on gaining access.

On the role of social exclusion, Twenge (2008) suggests that forewarned can be forearmed. Someone experiencing social exclusion would be advised to seek the company of friends or professional helpers. The techniques of cognitive-behavior therapy might be useful in self-generating messages of the kind “it will not last”.

Jewkes et al. (2010) noted the very high sense of entitlement amongst rapists. Sanday (1981, p.26) writes of the USA:

“The incidence of rape in our society will be reduced to the extent that boys grow to respect women and the qualities so often associated with femaleness in other societies – namely, nurturance, growth, and nature. Women can contribute to the socialization of boys by making these respected qualities in their struggle for equal rights.”

Therapeutic interventions might redirect dominance-seeking to more socially acceptable outlets (Cf. Johnson et al., 2012). An issue that arises is individual differences in the need to exert dominance (McClelland & Wilsnack, 1972). If some males have a high need, it might be possible to divert them to channels of harmless expression.

Consider the powerful triggering by System 1 when in the vicinity or presence of incentives. This reinforces the advice not to test out resistance to temptation by going near to its source (Clarke & Carter, 2000). Correspondingly, the literature on the hot-to-cold empathy gap in drug addiction makes the point that, when in a cold motivational state (e.g. drug-free and away from drugs), it is difficult to predict behavior that would arise when in a hot state, i.e. when picking up cues of the drug's presence. People commonly underestimate their tendency to give in to temptation.

References

- Abbey, A., Jacques-Tiura, A. J., & LeBreton, J. M. (2011). Risk factors for sexual aggression in young men: An expansion of the confluence model. *Aggressive Behavior*, 37(5), 450–464.
- Abbey, A., Wegner, R., Woerner, J., Pegram, S. E., & Pierce, J. (2014). Review of survey and experimental research that examines the relationship between alcohol consumption and men's sexual aggression perpetration. *Trauma, Violence & Abuse*, 15(4), 265–282.
- Abel, G. G., Coffey, L., & Osborn, C. A. (2008). Sexual arousal patterns: normal and deviant. *Psychiatric Clinics of North America*, 31(4), 643–655.
- Alexander, B. K. (2008). *The globalization of addiction: A study in the poverty of the spirit*. Oxford: Oxford University Press.
- Andrade, J., May, J., van Dillen, L., & Kavanagh, D. J. (2015). Elaborated intrusion theory: Explaining the cognitive and motivational basis of desire. In W. Hoffman, & L. F. Nordgren (Eds.), *The psychology of desire* (pp. 17–35). New York: The Guilford Press.
- Archer, J. (1992). *Ethology and human development*. Hemel Hempstead: Harvester Wheatsheaf.
- Arrigo, B. A., & Purcell, C. E. (2001). Explaining paraphilias and lust murder: Toward an integrated model. *International Journal of Offender Therapy and Comparative Criminology*, 45(1), 6–31.
- Bancroft, J., & Vukadinovic, Z. (2004). Sexual addiction, sexual compulsivity, sexual impulsivity, or what? Toward a theoretical model. *Journal of Sex Research*, 41(3), 225–234.
- Bargh, J. A., Raymond, P., Pryor, J. B., & Strack, F. (1995). Attractiveness of the underling: An automatic power → sex association and its consequences for sexual harassment and aggression. *Journal of Personality and Social Psychology*, 68(5), 768–781.
- Bartels, R. M., & Gannon, T. A. (2011). Understanding the sexual fantasies of sex offenders and their correlates. *Aggression and Violent Behavior*, 16, 551–561.
- Baumeister, R. F., Masicampo, E., & Vohs, K. D. (2011). Do conscious thoughts cause behavior? *Annual Review of Psychology*, 62, 331–361.
- Beck, A. T. (1996). Beyond belief: A theory of modes, personality, and psychopathology. In P. M. Salkovskis (Ed.), *Frontiers of cognitive therapy* (pp. 1–25). The Guilford Press: New York.
- Bem, D. J. (1996). Exotic becomes erotic: A developmental theory of sexual orientation. *Psychological Review*, 103(2), 320–335.
- Berkowitz, L. (1993). Towards a general theory of anger and emotional aggression: Implications of the cognitive-neoassociationistic perspective for the analysis of anger and other emotions. In R. S. Wyer, & T. K. Srull (Eds.), *Perspectives on anger and emotion: Advances in social cognition*. Vol. VI. (pp. 1–46). Hillsdale: Erlbaum.
- Berridge, K. C. (2004). Motivation concepts in behavioral neuroscience. *Physiology & Behavior*, 81(2), 179–209.
- Berridge, C. W., & Arnsten, A. F. T. (2013). Psychostimulants and motivated behavior: Arousal and cognition. *Neuroscience & Biobehavioral Reviews*, 37(9, Part A), 1976–1984.
- Berry-Dee, C. (2003). *Talking with serial killers*. London: John Blake Publishing.
- Bindra, D. (1978). How adaptive-behavior is produced – perceptual-motivational alternative to response-reinforcement. *Behavioral and Brain Sciences*, 1(1), 41–52.
- Bjork, J. M., Chen, G., & Hommer, D. W. (2012). Psychopathic tendencies and mesolimbic recruitment by cues for instrumental and passively obtained rewards. *Biological Psychology*, 89(2), 408–415.
- Black, D. W., Kehrberg, L. L. D., Flumerfelt, D. L., & Schlosser, S. S. (1997). Characteristics of 36 subjects reporting compulsive sexual behavior. *American Journal of Psychiatry*, 154, 243–249.
- Bluemke, M., & Teige-Mocigemba, S. (2015). Automatic processes in aggression: Conceptual and assessment issues. *Aggressive Behavior*, 41, 44–50.
- Brome, V. (1979). *Havelock Ellis: Philosopher of sex – A biography*. London: Routledge and Kegan Paul.

- Buckholtz, J. W., Treadway, M. T., Cowan, R. L., Woodward, N. D., Benning, S. D., et al. (2010). Mesolimbic dopamine reward system hypersensitivity in individuals with psychopathic traits. *Nature Neuroscience*, 13(4), 419–421.
- Cabib, S., & Puglisi-Allegra, S. (2012). The mesoaccumbens dopamine in coping with stress. *Neuroscience and Biobehavioral Reviews*, 36(1), 79–89.
- Carabellese, F., Maniglio, R., Greco, O., & Catanesi, R. (2011). The role of fantasy in a serial sexual offender: A brief review of the literature and a case report. *Journal of Forensic Sciences*, 56(1), 256–260.
- Carlisle, A. C. (1998). The divided self: Toward an understanding of the dark side of the serial killer. In R. M. Holmes, & S. T. Holmes (Eds.), *Contemporary perspectives on serial murder* (pp. 85–100). Thousand Oaks: Sage Publications.
- Carver, C. S. (2005). Impulse and constraint: Perspectives from personality psychology, convergence with theory in other areas, and potential for integration. *Personality and Social Psychology Review*, 9(4), 312–333.
- Carver, C. S., & Harmon-Jones, E. (2009). Anger is an approach-related affect: Evidence and implications. *Psychological Bulletin*, 135, 183–204.
- Carver, C. S., Johnson, S. L., & Joormann, J. (2008). Serotonergic function, two-mode models of self-regulation, and vulnerability to depression: What depression has in common with impulsive aggression. *Psychological Bulletin*, 134, 912–943.
- Chan, H., & Heide, K. M. (2009). Sexual Homicide. *Trauma, Violence & Abuse*, 10(1), 31–54.
- Chaney, M. P., & Chang, C. Y. (2005). A trio of turmoil for internet sexually addicted men who have sex with men: Boredom proneness, social connectedness, and dissociation. *Sexual Addiction & Compulsivity*, 12, 3–18.
- Chein, J., Albert, D., O'Brien, L., Uckert, K., & Steinberg, L. (2011). Peers increase adolescent risk taking by enhancing activity in the brain's reward circuitry. *Developmental Science*, 14(2), F1–F10.
- Clarke, J., & Carter, A. J. (2000). Relapse prevention with sexual murderers. In D. R. Laws, S. M. Hudson, & T. Ward (Eds.), *Remaking relapse prevention with sex offenders: A sourcebook* (pp. 389–401). Thousand Oaks: Sage Publications.
- Cortoni, F., & Marshall, W. L. (2001). Sex as a coping strategy and its relationship to juvenile sexual history and intimacy in sexual offenders. *Sexual Abuse: A Journal of Research and Treatment*, 13(1), 27–43.
- Costa, V. D., Lang, P. J., Sabatinelli, D., Versace, F., & Bradley, M. M. (2010). Emotional imagery: assessing pleasure and arousal in the brain's reward circuitry. *Human Brain Mapping*, 31, 1446–1457.
- Couppis, M., & Kennedy, C. (2008). The rewarding effect of aggression is reduced by nucleus accumbens dopamine receptor antagonism in mice. *Psychopharmacology*, 197(3), 449–456.
- Damsma, G., Pfau, J. G., Wenkstern, D., Phillips, A. G., & Fibiger, H. C. (1992). Sexual behavior increases dopamine transmission in the nucleus accumbens and striatum of male rats: Comparison with novelty and locomotion. *Behavioral Neuroscience*, 106(1), 181–191.
- Darke, J. L. (1990). Sexual aggression: Achieving power through humiliation. In W. L. Marshall, D. R. Laws, & H. E. Barbaree (Eds.), *Handbook of Sexual Assault: Issues, Theories and Treatment of the Offender* (pp. 55–72). New York: Plenum Press.
- De Ridder, D. T. D., de Witt Huberts, J. C., & Evers, C. (2015). License to sin: Reasoning processes in desire. In W. Hoffman, & L. F. Nordgren (Eds.), *The Psychology of Desire* (pp. 199–224). New York: The Guilford Press.
- Decety, J., & Ickes, W. (2011). *The Social Neuroscience of Empathy*. Cambridge: MIT Press.
- Denson, T. F., Schofield, T. P., & Fabiansson, E. C. (2015). Aggressive desires. In W. Hoffman, & L. F. Nordgren (Eds.), *The psychology of desire* (pp. 369–389). New York: The Guilford Press.
- Derryberry, D., & Rothbart, M. K. (1997). Reactive and effortful processes in the organization of temperament. *Development and Psychopathology*, 9(04), 633–652.
- Diamond, L. M. (2006). How do I love thee? Implications of attachment theory for understanding same-sex love and desire. In M. Mikulincer, & G. S. Goodman (Eds.), *Dynamics of romantic love: Attachment, caregiving and sex* (pp. 275–292). The Guilford Press: New York.
- Ditto, P. H., Pizarro, D. A., Epstein, E. B., Jacobson, J. A., & MacDonald, T. K. (2006). Visceral influences on risk-taking behavior. *Journal of Behavioral Decision Making*, 19(2), 99–113.
- Doidge, N. (2007). *The brain that changes itself*. New York: Viking Books.
- Donnerstein, E. I. (1983). Erotica and human aggression. In R. G. Geen, & E. I. Donnerstein (Eds.), *Aggression: Theoretical and empirical reviews* (pp. 127–154). New York: Academic Press.
- Douglas, J., & Olshaker, M. (2006). *Mindhunter*. London: Arrow Books.
- Drake, C. R., & Ward, T. (2003). Treatment models for sex offenders: A move toward a formulation-based approach. In T. Ward, D. R. Laws, & S. M. Hudson (Eds.), *Sexual deviance: Issues and controversies* (pp. 226–243). Sage Publications: Thousand Oaks.
- Dutton, D., & Strachan, C. (1987). Motivational needs for power and dominance as differentiating variables of assaultive and non-assaultive men. *Violence and Victims*, 2(3), 145–156.
- Eisenman, R., Dantzer, M., & Ellis, L. (2004). Self ratings of dependency/addiction regarding drugs, sex, love, and food: Male and female college students. *Sexual Addiction & Compulsivity*, 11(3), 115–127.
- Eldridge, H., & Saradjian, J. (2000). Replacing the function of abusive behaviors for the offender: Remaking relapse prevention in working with women who sexually abuse children. In D. R. Laws, S. M. Hudson, & T. Ward (Eds.), *Remaking relapse prevention with sex offenders* (pp. 402–426). Thousand Oaks: Sage Publications.
- Ellis, L. (1989). *Theories of rape: Inquiries into the causes of sexual aggression*. London: Taylor & Francis.
- Felson, R. B. (2002). *Violence and gender reexamined*. Washington: American Psychological Association.
- Ferrari, P. F., van Erp, A. M. M., Tornatzky, W., & Miczek, K. A. (2003). Accumbal dopamine and serotonin in anticipation of the next aggressive episode in rats. *European Journal of Neuroscience*, 17, 371–378.
- Fiorillo, C. D., Tobler, P. N., & Schultz, W. (2003). Discrete coding of reward probability and uncertainty by dopamine neurons. *Science*, 299(5614), 1898–1902.
- Fiorino, D. F., Coury, A., & Phillips, A. G. (1997). Dynamic changes in nucleus accumbens dopamine efflux during the Coolidge effect in male rats. *The Journal of Neuroscience*, 17(12), 4849–4855.
- Fisher, D., & Beech, A. R. (2007). The implicit theories of rapists and sexual murderers. In T. A. Gannon, T. Ward, A. R. Beech, & D. Fisher (Eds.), *Aggressive offenders' cognition: Theory, research and practice* (pp. 31–52). London: John Wiley & Sons Ltd. London.
- Fiske, A. P., & Rai, T. S. (2014). *Virtuous violence*. Cambridge: Cambridge University Press.
- Fodor, E. M. (2010). Power motivation. In O. C. Schultheiss, & J. C. Brunstein (Eds.), *Implicit motives* (pp. 3–29). Oxford: Oxford University Press.
- Gannon, T. A., Ward, T., Beech, A. R., & Fisher, D. (2007). Introduction. In T. A. Gannon, T. Ward, A. R. Beech, & D. Fisher (Eds.), *Aggressive offenders' cognition: Theory, research and practice* (pp. 1–7). Chichester: John Wiley & Sons.
- Giancola, P. R. (2000). Executive functioning: A conceptual framework for alcohol-related aggression. *Experimental and Clinical Psychopharmacology*, 8, 576–597.
- Gilbert, D. T., & Wilson, T. D. (2007). Prospection: Experiencing the future. *Science*, 317(5843), 1351–1354.
- Giugliano, J. R. (2008). Sexual impulsivity, compulsivity or dependence: An investigative inquiry. *Sexual Addiction & Compulsivity*, 15, 139–157.
- Grant, J. E., Potenza, M. N., Weinstein, A., & Gorelick, D. A. (2010). Introduction to behavioral addictions. *The American Journal of Drug and Alcohol Abuse*, 36(5), 233–241.
- Gray, J. A., & McNaughton, N. (2000). *The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system*. Oxford: Oxford University Press.
- Grubin, D. (1994). Sexual murder. *The British Journal of Psychiatry*, 165(5), 624–629.
- Hall, J. L., Stanton, S. J., & Schultheiss, O. C. (2010). Biopsychological and neural processes of implicit motivation. In O. Schultheiss, & J. C. Brunstein (Eds.), *Implicit motives* (pp. 279–307). Oxford University Press: Oxford.
- Hanson, R. K. (2000). What is so special about relapse prevention? In D. R. Laws, S. M. Hudson, & T. Ward (Eds.), *Remaking relapse prevention with sex offenders: A sourcebook* (pp. 27–38). Sage Publications: Thousand Oaks.
- Hecht, D. (2011). An inter-hemispheric imbalance in the psychopath's brain. *Personality and Individual Differences*, 51(1), 3–10.
- Holmes, R. M. (1998). Sequential predation: Elements of serial fatal victimization. In R. M. Holmes, & S. T. Holmes (Eds.), *Contemporary perspectives on serial murder* (pp. 101–112). Sage Publications: Thousand Oaks.
- Hudson, S. M., & Ward, T. (2000). Relapse prevention: Assessment and treatment implications. In D. R. Laws, S. M. Hudson, & T. Ward (Eds.), *Remaking relapse prevention with sex offenders* (pp. 102–122). Thousand Oaks: Sage Publications.
- Janssen, E., & Bancroft, J. (2007). The dual-control model: The role of sexual inhibition and excitation in sexual arousal and behavior. In E. Janssen (Ed.), *The psychophysiology of sex* (pp. 197–222). Bloomington: Indiana University Press.
- Jewkes, R., Sikweyiya, Y., Morrell, R., & Dunkle, K. (2010). Why, when and how men rape: Understanding rape perpetration in South Africa. *South African Crime Quarterly*, 34, 23–31.
- Johnson, B. R., & Becker, J. V. (1997). Natural born killers?: The development of the sexually sadistic serial killer. *Journal of the American Academy of Psychiatry and the Law Online*, 25(3), 335–348.
- Johnson, S. L., Leedom, L. J., & Muhtadie, L. (2012). The dominance behavioral system and psychopathology: Evidence from self-report, observational, and biological studies. *Psychological Bulletin*, 138(4), 692–743.
- Jones, R. (2003). Research and practice with adolescent sexual offenders. In T. Ward, D. R. Laws, & S. M. Hudson (Eds.), *Sexual deviance: Issues and controversies* (pp. 190–206). Thousand Oaks: Sage Publications.
- Kafka, M. P. (2000). The paraphilia-related disorders. In S. R. Leiblum, & R. C. Rosen (Eds.), *Principles and practice of sex therapy* (pp. 471–503). Guilford Press: New York.
- Kafka, M. P., & Prentky, R. (1992). A comparative study of nonparaphilic sexual addictions and paraphilias in men. *Journal of Clinical Psychiatry*, 53(10), 345–350.
- Kavanagh, D. J., Andrade, J., & May, J. (2005). Imaginary relish and exquisite torture: the elaborated intrusion theory of desire. *Psychological Review*, 112(2), 446–467.
- Kilts, C. D., Gross, R. E., Ely, T. D., & Drexler, K. P. G. (2004). The neural correlates of cue-induced craving in cocaine-dependent women. *American Journal of Psychiatry*, 161(2), 233–241.
- Knight, R. A. (1999). Validation of a typology for rapists. *Journal of Interpersonal Violence*, 14(3), 303–330.
- Köksal, F., Domjan, M., Kurt, A., Sertel, O., Orung, S., et al. (2004). An animal model of fetishism. *Behaviour Research and Therapy*, 42(12), 1421–1434.
- Kraanen, F. L., & Emmelkamp, P. M. G. (2011). Substance misuse and substance use disorders in sex offenders: A review. *Clinical Psychology Review*, 31(3), 478–489.
- Kringelbach, M. L., & Berridge, K. C. (2015). Motivation and pleasure in the brain. In W. Hoffman, & L. F. Nordgren (Eds.), *The psychology of desire* (pp. 129–145). New York: The Guilford Press.
- Lalumière, M. L., Chalmers, L. J., Quinsey, V. L., & Seto, M. C. (1996). A test of the mate deprivation hypothesis of sexual coercion. *Ethology and Sociobiology*, 17(5), 299–318.
- Lalumière, M. L., Quinsey, V. L., Harris, G. T., Rice, M. E., & Trautrimas, C. (2003). Are rapists differentially aroused by coercive sex in phallometric assessments? *Annals of the New York Academy of Sciences*, 989(1), 211–224.
- Langton, C. M. (2007). Rape-related cognition: Current research. In T. W. T. Gannon, A. R. Beech, & D. Fisher (Eds.), *Aggressive offenders' cognition. Theory, research and practice* (pp. 91–116). Chichester: John Wiley.
- Laws, D. R. (2003). Behavioral economic approaches to the assessment and treatment of sexual deviation. In T. Ward, D. R. Laws, & S. M. Hudson (Eds.), *Sexual deviance: Issues and controversies* (pp. 65–81). Thousand Oaks: Sage Publications.

- Laws, D. R., Hudson, S. M., & Ward, T. (2000). The original model of relapse prevention with sex offenders. In D. R. Laws, S. M. Hudson, & T. Ward (Eds.), *Remaking relapse prevention with sex offenders: A sourcebook* (pp. 3–24). Thousand Oaks: Sage Publications (3–24).
- Leitenberg, H., & Henning, K. (1995). Sexual fantasy. *Psychological Bulletin*, 117(3), 469–496.
- Leyton, M., & Vezina, P. (2014). Dopamine ups and downs in vulnerability to addictions: a neurodevelopmental model. *Trends in Pharmacological Sciences*, 35(6), 268–276.
- Libby, L. K., Shaeffer, E. M., Eibach, R. P., & Slemmer, J. A. (2007). Picture yourself at the polls: Visual perspective in mental imagery affects self-perception and behavior. *Psychological Science*, 18, 199–203.
- Lisak, D., & Ivan, C. (1995). Deficits in intimacy and empathy in sexually aggressive men. *Journal of Interpersonal Violence*, 10(3), 296–308.
- Loewenstein, G., Nagin, D., & Paternoster, R. (1997). The effect of sexual arousal on expectations of sexual forcefulness. *Journal of Research in Crime and Delinquency*, 34(4), 443–473.
- Lomanowska, A. M., Lovic, V., Rankine, M. J., et al. (2011). Inadequate early social experience increases the incentive salience of reward-related cues in adulthood. *Behavioural Brain Research*, 220(1), 91–99.
- Lopez, R. B., Wagner, D. D., & Heatherton, T. F. (2015). Neuroscience of desire regulation. In W. Hoffman, & L. F. Nordgren (Eds.), *The psychology of desire* (pp. 146–160). New York: The Guilford Press.
- Luria, A. R. (1966). *Higher cortical function in man*. London: Tavistock Press.
- MacCulloch, M., Gray, N., & Watt, A. (2000). Brittain's Sadistic Murderer Syndrome reconsidered: an associative account of the aetiology of sadistic sexual fantasy. *Journal of Forensic Psychiatry*, 11(2), 401–418.
- MacCulloch, M., Snowden, P., Wood, P., & Mills, H. (1983). Sadistic fantasy, sadistic behaviour and offending. *The British Journal of Psychiatry*, 143(1), 20–29.
- MacLean, P. D. (1990). *The triune brain in evolution*. New York: Plenum Press.
- Malamuth, N. M. (1998). The confluence model as an organizing framework for research on sexually aggressive men: Risk moderators, imagined aggression, and pornography consumption. In R. G. Geen, & E. Donnerstein (Eds.), *Human aggression: Theories, research, and implications for society* (pp. 229–245). New York: Academic Press.
- Malamuth, N. M., Sockloskie, R. J., Koss, M. P., & Tanaka, J. S. (1991). Characteristics of aggressors against women: Testing a model using a national sample of college students. *Journal of Consulting and Clinical Psychology*, 59(5), 670–681.
- Maltz, W., & Maltz, L. (2010). *The porn trap*. New York: HarperCollins.
- Mann, R., & Hollin, C. (2010). Self-reported schemas in sexual offenders. *The Journal of Forensic Psychiatry & Psychology*, 21(6), 834–851.
- Marques, J. K., Nelson, C., Alarcon, J., & Day, D. M. (2000). Preventing relapse in sex offenders: What we learned from SOTEP's experimental treatment program. In D. R. Laws, S. M. Hudson, & T. Ward (Eds.), *Remaking relapse prevention with sex offenders* (pp. 321–340). Thousand Oaks: Sage Publications.
- Marshall, W. L., & Barbaree, H. E. (1990). An integrated theory of the etiology of sexual offending. In W. L. Marshall, D. R. Laws, & H. E. Barbaree (Eds.), *Handbook of sexual assault: Issues, theories and treatment of the offender* (pp. 257–275). New York: Plenum Press.
- Mason, A., & Blankenship, V. (1987). Power and affiliation motivation, stress, and abuse in intimate relationships. *Journal of Personality and Social Psychology*, 52(1), 203–210.
- May, M. E. (2011). Aggression as positive reinforcement in people with intellectual disabilities. *Research in Developmental Disabilities*, 32(6), 2214–2224.
- McClelland, D., & Wilsnack, S. C. (1972). The effects of drinking on thoughts about power and restraint. In D. C. McClelland, W. N. Davis, R. Kalin, & E. Wanner (Eds.), *The drinking man* (pp. 123–141). New York: The Free Press.
- McClelland, D. C., Koestner, R., & Weinberger, J. (1989). How do self-attributed and implicit motives differ? *Psychological Review*, 96(4), 690–702.
- McClure, S. M., Laibson, D. I., Loewenstein, G., & Cohen, J. D. (2004). Separate neural systems value immediate and delayed monetary rewards. *Science*, 306, 503–507.
- McGuire, R. J., Carlisle, J. M., & Young, B. G. (1965). Sexual deviations as conditioned behaviour: A hypothesis. *Behaviour Research and Therapy*, 2, 185–190.
- McKibben, A., Proulx, J., & Lusignan, R. (1994). Relationships between conflict, affect and deviant sexual behaviors in rapists and pedophiles. *Behaviour Research and Therapy*, 32(5), 571–575.
- Miller, L. (2014). Serial killers: I. Subtypes, patterns, and motives. *Aggression and Violent Behavior*, 19, 1–11.
- Moskowitz, D. A., & Rolloff, M. E. (2007). The ultimate high: Sexual addiction and the bug chasing phenomenon. *Sexual Addiction & Compulsivity*, 14, 21–40.
- Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, 126(2), 247–259.
- Murrin, M. R., & Laws, D. R. (1990). The influence of pornography on sexual crimes. In W. L. Marshall, D. R. Laws, & H. E. Barbaree (Eds.), *Handbook of sexual assault: Issues, theories and treatment of the offender* (pp. 73–91). New York: Plenum Press.
- Myers, W. C., Burgess, A. W., & Nelson, J. A. (1998). Criminal and behavioral aspects of juvenile sexual homicide. *Journal of Forensic Sciences*, 43(2), 340–347.
- Myers, W. C., Reccoppa, L., Burton, K., & McElroy, R. (1993). Malignant sex and aggression: An overview of serial sexual homicide. *Journal of the American Academy of Psychiatry and the Law Online*, 21(4), 435–451.
- Nagin, D., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development*, 70(5), 1181–1196.
- Oscar-Berman, M., & Marinković, K. (2007). Alcohol: Effects on neurobehavioral functions and the brain. *Neuropsychology Review*, 17(3), 239–257.
- Patterson, C. M., & Newman, J. P. (1993). Reflectivity and learning from aversive events: toward a psychological mechanism for the syndromes of disinhibition. *Psychological Review*, 100(4), 716–736.
- Peciña, S., Schulkin, J., & Berridge, K. C. (2006). Nucleus accumbens corticotropin-releasing factor increases cue-triggered motivation for sucrose reward: paradoxical positive incentive effects in stress? *BMC Biology*, 4(1), 8.
- Pfaus, J. G. (2009). Pathways of sexual desire. *The Journal of Sexual Medicine*, 6(6), 1506–1533.
- Pithers, W. D., Marques, J. K., Gibat, C. C., & Marlatt, G. A. (1983). Relapse prevention with sexual aggressives: A self-control model of treatment and maintenance of change. In J. G. Greer, & I. R. Stuart (Eds.), *The sexual aggressor: Current perspectives on treatment* (pp. 214–239). New York: Van Nostrand Reinhold.
- Porter, S., Demetroff, S., & ten Brinke, L. (2010). The sexual psychopath - Current understanding and future challenges. In A. Schlank (Ed.), *The sexual predator: Legal issues. Assessment. Treatment, IV*. Kingston, N.J.: Civic Research Institute (pp. 13–11 and 13–16).
- Proeve, M. J. (2003). Responsivity factors in sexual offender treatment. In T. Ward, D. R. Laws, & S. M. Hudson (Eds.), *Sexual deviance: Issues and controversies* (pp. 244–261). Thousand Oaks: Sage.
- Pryor, J. B., & Stoller, L. M. (1994). Sexual cognition processes in men high in the likelihood to sexually harass. *Personality and Social Psychology Bulletin*, 20(2), 163–169.
- Raine, A. (2013). *The anatomy of violence: The biological roots of crime*. London: Vintage.
- Ramsey, G. V. (1943). The sexual development of boys. *American Journal of Psychology*, 56(2), 217–233.
- Redstall, V. (2011). *Serial killers up close and very personal*. London: John Blake.
- Regan, P. C., & Berscheid, E. (1999). *Lust: What we know about human sexual desire*. London: Sage Publications.
- Reid, J. A., Beauregard, E., Fedina, K. M., & Frith, E. N. (2014). Employing mixed methods to explore motivational patterns of repeat sex offenders. *Journal of Criminal Justice*, 42(2), 203–212.
- Ressler, R. K., Burgess, A. W., & Douglas, J. E. (1992). *Sexual homicide: patterns and motives*. New York: The Free Press.
- Rizzolatti, G., & Sinigaglia, C. (2008). *Mirrors in the brain: How our minds share actions and emotions*. Oxford: Oxford University Press.
- Robbins, R. N., & Bryan, A. (2004). Relationships between future orientation, impulsive sensation seeking, and risk behavior among adjudicated adolescents. *Journal of Adolescent Research*, 19(4), 428–445.
- Robinson, T. E., & Berridge, K. C. (1993). The neural basis of drug craving - An incentive-sensitization theory of addiction. *Brain Research Reviews*, 18(3), 247–291.
- Rousseau, J.-J. (1781/1953). *The confessions*. London: Penguin Books.
- Ryan, M. (1995). *Secret life: An autobiography*. New York: Pantheon.
- Salamone, J. D., Correa, M., Farrar, A., & Mingote, S. M. (2007). Effort-related functions of nucleus accumbens dopamine and associated forebrain circuits. *Psychopharmacology*, 191(3), 461–482.
- Sanday, P. R. (1981). The socio-cultural context of rape: A cross-cultural study. *Journal of Social Issues*, 37(4), 5–27.
- Schlesinger, L. B. (2001). The potential sex murderer: Ominous signs, risk assessment. *Journal of Threat Assessment*, 1, 47–72.
- Schlesinger, L. B. (2007). Sexual homicide: Differentiating catathymic and compulsive murders. *Aggression and Violent Behavior*, 12(2), 242–256.
- Schneider, J. P., & Weiss, R. (2001). *Cybersex exposed: Recognizing the obsession*. Hazelton: Hazelton Information and Educational Services.
- Schultheiss, O. C., & Brunstein, J. (2010). *Implicit motives*. Oxford: Oxford University Press.
- Schultheiss, O. C., & Hale, J. A. (2007). Implicit motives modulate attentional orienting to facial expressions of emotion. *Motivation and Emotion*, 31(1), 13–24.
- Schultheiss, O. C., Campbell, K. L., & McClelland, D. C. (1999). Implicit power motivation moderates men's testosterone responses to imagined and real dominance success. *Hormones and Behavior*, 36(3), 234–241.
- Schultheiss, O. C., Dargel, A., & Rohde, W. (2003). Implicit motives and sexual motivation and behavior. *Journal of Research in Personality*, 37(3), 224–230.
- Sestir, M. A., & Bartholow, B. (2007). Theoretical explanations of aggression and violence. In T. A. Gannon, T. Ward, A. R. Beech, & D. Fisher (Eds.), *Aggressive offenders' cognition. Theory, research and practice* (pp. 157–178). Chichester: John Wiley.
- Sharot, T., Shiner, T., Brown, A. C., Fan, J., & Dolan, R. J. (2009). Dopamine enhances expectation of pleasure in humans. *Current Biology*, 19(24), 2077–2080.
- Silva, J. A., Ferrari, M. M., & Leong, G. B. (2002). The case of Jeffrey Dahmer: Sexual serial homicide from a neuropsychiatric developmental perspective. *Journal of Forensic Sciences*, 47(6), 1347–1359.
- Silvio, H., McCloskey, K., & Ramos-Grenier, J. (2006). Theoretical consideration of female sexual predator serial killers in the United States. *Journal of Criminal Justice*, 34(3), 251–259.
- Sinha, R. (2001). How does stress increase risk of drug abuse and relapse? *Psychopharmacology*, 158(4), 343–359.
- Spiering, M., & Everaerd, W. (2007). The sexual unconscious. In E. Janssen (Ed.), *The psychophysiology of sex* (pp. 166–184). Bloomington: Indiana University Press.
- Spoont, M. R. (1992). Modulatory role of serotonin in neural information processing: Implications for human psychopathology. *Psychological Bulletin*, 112(2), 330–350.
- Stanton, S. J., Hall, J. L., & Schultheiss, O. C. (2010). Properties of motive-specific incentives. In O. C. Schultheiss, & J. C. Brunstein (Eds.), *Implicit motives* (pp. 245–278). Oxford: Oxford University Press.
- Steele, C. M., & Josephs, R. A. (1990). Alcohol myopia - Its prized and dangerous effects. *American Psychologist*, 45(8), 921–933.
- Steeves, T. D. L., Miyasaki, J., Zurowski, M., Lang, A. E., Pellicchia, G., Van Eimeren, T., & Strafella, A. P. (2009). Increased striatal dopamine release in Parkinsonian patients with pathological gambling: A [11C] raclopride PET study. *Brain*, 132(5), 1376–1385.
- Stein, D. J., Black, D. W., Shapira, N. A., & Spitzer, R. L. (2001). Hypersexual disorder and preoccupation with internet pornography. *American Journal of Psychiatry*, 158, 1590–1594.

- Sunderwirth, S. G., & Milkman, H. (1991). Behavioral and neurochemical commonalities in addiction. *Contemporary Family Therapy*, 13(5), 421–433.
- Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
- Testa, M. (2004). The role of substance use in male-to-female physical and sexual violence: A brief review and recommendations for future research. *Journal of Interpersonal Violence*, 19(12), 1494–1505.
- Thakker, J., Ward, T., & Navathe, S. (2007). The cognitive distortions and implicit theories of child sexual abusers. In T. A. Gannon, T. Ward, A. R. Beech, & D. Fisher (Eds.), *Aggressive offenders' cognition: Theory, research and practice* (pp. 11–29). Chichester: John Wiley.
- Tharp, A. T., DeGue, S., Valle, L. A., Brookmeyer, K. A., Massetti, G. M., & Matjasko, J. L. (2013). A systematic qualitative review of risk and protective factors for sexual violence perpetration. *Trauma, Violence & Abuse*, 14(2), 133–167.
- Thompson, M. E. (2009). Human rape: Revising evolutionary perspectives. In N. Martin, M. N. Muller, & R. W. Wrangham (Eds.), *Sexual coercion in primates and humans: An evolutionary perspective on male aggression against females* (pp. 346–374). Cambridge, Mass: Harvard University Press.
- Thornhill, R., & Palmer, C. T. (2000). *A natural history of rape*. Cambridge, MA: MIT Press.
- Toates, F. (1986). *Motivational systems*. Cambridge: Cambridge University Press.
- Toates, F. (1998). The interaction of cognitive and stimulus–response processes in the control of behaviour. *Neuroscience & Biobehavioral Reviews*, 22(1), 59–83.
- Toates, F. (2006). A model of the hierarchy of behavior, cognition, and consciousness. *Consciousness and Cognition*, 15(1), 75–118.
- Toates, F. (2009). An integrative theoretical framework for understanding sexual motivation, arousal, and behavior. *Journal of Sex Research*, 46(2–3), 168–193.
- Toates, F. (2014). *How sexual desire works: The enigmatic urge*. Cambridge: Cambridge University Press.
- Turner, M. (2008). Female sexual compulsivity: A new syndrome. *Psychiatric Clinics of North America*, 31(4), 713–727.
- Twenge, J. M. (2008). Social exclusion, motivation, and self-defeating behavior: Why breakups lead to drunkenness and ice cream. In J. Y. Shah, & W. L. Gardner (Eds.), *Handbook of Motivation Science* (pp. 508–517). New York: The Guilford Press.
- van Erp, A. M. M., & Miczek, K. A. (2000). Aggressive behavior, increased accumbal dopamine, and decreased cortical serotonin in rats. *The Journal of Neuroscience*, 20(24), 9320–9325.
- Van Kleef, G. A., Oveis, C., Van Der Löwe, I., LuoKogan, A., Goetz, J., Keltner, D., et al. (2008). Power, distress, and compassion turning a blind eye to the suffering of others. *Psychological Science*, 19(12), 1315–1322.
- Vohs, K. D., & Baumeister, R. F. (2008). Can satisfaction reinforce wanting? A new theory about long-term changes in strength of motivation. In J. Y. Shah, & W. L. Gardner (Eds.), *Handbook of motivation science* (pp. 373–389). New York: The Guilford Press.
- Vohs, K. D., & Baumeister, R. F. (2009). Addiction and free will. *Addiction Research and Theory*, 17(3), 231–235.
- Voon, V., Mole, T. B., Banca, P., Porter, L., Morris, L., Mitchell, S., ... Irvine, M. (2014). Neural correlates of sexual cue reactivity in individuals with and without compulsive sexual behaviours. *PLoS One*, 9(7), 1–10.
- Vronsky, P. (2004). *Serial killers: The method and madness of monsters*. New York: Berkeley Books.
- Ward, T., & Beech, A. (2006). An integrated theory of sexual offending. *Aggression and Violent Behavior*, 11(1), 44–63.
- Ward, T., & Brown, M. (2003). The risk-need model of offender rehabilitation. In T. Ward, D. R. Laws, & S. M. Hudson (Eds.), *Sexual deviance: Issues and controversies* (pp. 338–353). Thousand Oaks: Sage Publications.
- Ward, T., & Hudson, S. M. (1998). A model of the relapse process in sexual offenders. *Journal of Interpersonal Violence*, 13(6), 700–725.
- Ward, T., & Hudson, S. M. (2000). A self-regulation model of relapse prevention. In D. R. Laws, S. M. Hudson, & T. Ward (Eds.), *Remaking relapse prevention with sex offenders: A sourcebook* (pp. 79–101). Thousand Oaks: Sage Publications.
- Ward, T., Hudson, S. M., & Keenan, T. (1998). A self-regulation model of the sexual offense process. *Sexual Abuse: A Journal of Research and Treatment*, 10(2), 141–157.
- Washton, A. M., & Stone-Washton, N. (1993). Outpatient treatment of cocaine and crack addiction: A clinical perspective. *NIDA Research Monograph*, 135, 15.
- Weiss, J. M. (1971). Effects of coping behavior with and without a feedback signal on stress pathology in rats. *Journal of Comparative and Physiological Psychology*, 77(1), 22–30.
- Westen, D., Blagov, P. S., Harenski, K., Kilts, C., & Hamann, S. (2006). Neural bases of motivated reasoning: An fMRI study of emotional constraints on partisan political judgment in the 2004 US presidential election. *Journal of Cognitive Neuroscience*, 18(11), 1947–1958.
- Wiederman, M. W. (2004). Self-control and sexual behavior. In R. F. Baumeister, & K. D. Vohs (Eds.), *Handbook of self-regulation: research, theory, and applications* (pp. 525–536). Guilford Press: New York.
- Winter, D. G. (1973). *The power motive*. New York: The Free Press.
- Wolf, S. C. (1989). A model of sexual aggression/addiction. *Journal of Social Work & Human Sexuality*, 7(1), 131–148.
- Woodworth, M., Freimuth, T., Hutton, E. L., Carpenter, T., Agar, A. D., & Logan, M. (2013). High-risk sexual offenders: an examination of sexual fantasy, sexual paraphilia, psychopathy, and offence characteristics. *International Journal of Law and Psychiatry*, 36(2), 144–156.
- Young, A. M. J., Ahier, R. G., Upton, R. L., Joseph, M. H., & Gray, J. A. (1998). Increased extracellular dopamine in the nucleus accumbens of the rat during associative learning of neutral stimuli. *Neuroscience*, 83(4), 1175–1183.
- Zuckerman, M. (1990). The psychophysiology of sensation seeking. *Journal of Personality*, 58(1), 313–345.
- Zurbriggen, E. L. (2000). Social motives and cognitive power–sex associations: Predictors of aggressive sexual behavior. *Journal of Personality and Social Psychology*, 78(3), 559–581.