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SUBSTITUTE ADDICTION: A CONCERN FOR RESEARCHERS AND PRACTITIONERS*

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ABSTRACT

An understanding of the role of substitute addictions remains unclear. This article examines the range and possible reward functions of substitute addictions. We suggest that prevention education and treatment need to take into account substitute addictions as an influential aspect of recovery. Research is needed to better understand the prevalence and functions of, and solutions to substitute addictions.

The notion of "substitute addiction" has been discussed a long time by members of the recovery movement and by recovery specialists (Chiauzzi, 1991; Gorski & Miller, 1986; Horvath, 1999, 2006; Murphy & Hoffman, 1993; Sussman, 2005; Sussman & Ames, 2001; Sussman, Patten, & Order-Connors, 2005). This concept refers to any addictive behavior that serves at least one key function previously achieved by another addictive behavior (e.g., relaxation, escape, excitement, pleasure, reduction of negative affect, social lubrication; e.g., Zweben, 1987). An array of addictions has been identified in the addictions treatment and research arenas, and it is plausible that any of these addiction processes may serve as substitutes for each other.

In this article, we address the topic of substitute addictions. First, we describe the breadth of different addictive behaviors about which substitute addictions may

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pertain. Next, we describe the functions of substitute addiction; in particular, impact on the reward processes that may explain how these different behaviors might serve as substitutes for each other. Third, we discuss the available empirical research on this topic, including concepts that may help to explain the course of substitute addictions (i.e., Gateway and Harm Reduction models). Finally, we present limitations of this concept and offer practical implications for prevention and treatment.

THE BREADTH OF ADDICTIVE BEHAVIORS

There are many addictive behaviors that might serve as substitutes. Schaef (1987) proposed a typology in an attempt to differentially classify various addictive behaviors. The first type, *substance addictions,* involves direct manipulation of pleasure through the use of products that are taken into the body. According to him, substance addictions involve all mood-altering products, including drug- (e.g., caffeine, nicotine, alcohol, cocaine, heroin, etc.) and food-related disorders (e.g., anorexia, bulimia, overeating, etc.). While the DSM-IV does not recognize food as a substance of abuse, James, Gold, and Liu (2004) identified converging neuroimaging, cognitive, and behavioral findings that suggested food reasonably fits within a model of substance dependence.

The second type, *process addictions* (Schaef, 1987), consists of a series of pathological behaviors that exposes one to "mood-altering events" on which one achieves pleasure and becomes dependent. Process addictions involve a relatively indirect manipulation of pleasure through situational and physical activity manipulations (Eick, 1999; Robinson & Berridge, 2000). There are several process addictions identified in the current literature including dependence on video game playing, gambling, Internet use, sex, work, exercise, compulsive spending, and religion.

There are a growing number of researchers who suggest that arcade videogames share some common ground with slot machine gambling, and contain a risk for dependence (e.g., Fisher, 1994; Griffiths, 1997b; Gupta & Derevensky, 1996). Similarly, many videogames are found on the Internet, which resemble gambling activities such as slot machine simulation and bidding. Young (1999) phrased the term "Internet Addiction Disorder" (IAD) using diagnostic criteria that began a starting point for its acknowledgment as an addiction. Individuals with IAD are likely to use the internet to alter moods (i.e., attempt to escape when feeling down or anxious), are preoccupied with Internet use, report symptoms of tolerance and withdrawal, have tried unsuccessfully to cut back on use, and have disturbances in their lives because of their Internet use (Chebbi, 2000; Morahan-Martin, 2001; Ng & Wiemer-Hastings, 2005).

Another process addictive behavior is sexual addiction. It is estimated that 3% to 6% of the U.S. population exhibit addictive sexual disorders (Carnes, 1991; Carnes, Nonemaker, & Skilling, 1991). Sex addiction is the compulsivity to

engage in sexual practices regardless of consequences, such as HIV and jail sentence (see Schneider and Irons (2001) for a discussion of sexual addiction). Workaholism is an addiction to working, and is characterized by feeling an excessive and uncontrollable need to work, perfectionism, not delegating responsibility, difficulty in interpersonal relationships, and mental preoccupation with the future leading to stress, unhappiness, and intimacy problems (Oates, 1971; see Burke (2000) for expanded definition and empirical review). Exercise can become a craving for some people when it is engaged in compulsively (e.g., going jogging three times per day), when other life roles are neglected, when not exercising leads to depressed mood, and when it leads to repeated injuries (Griffiths, 1997a; Thaxton, 1982). Compulsive spenders repeatedly incur debt despite negative emotional, social, and financial consequences. They also tend to greatly value money as a solution to problems (Hanley & Wilhelm, 1992). One may even become addicted to the practice of religion. According to Taylor (2002, p. 313), "Religious addiction, although newly defined, is nevertheless an addiction. . . . It has the same highs and lows, and it destroys families just as easily." Religious addiction may serve the same functions as other addictions, such as allowing the addict to flee from painful realities and emotions through rigid faith routines within inflexible social environments (Linn, Linn, & Linn, 1994; Vanderheyden, 1999). Arterburn and Felton (1991) propose that pent up tension and anxiety are relieved in these individuals by extensive ritualistic behavior, which can be considered a form of getting "high."

SUBSTITUTE ADDICTIONS

That there may be a wide variety of behaviors that one can become dependent on, repeat excessively, and suffer consequences from, suggests the opportunity for someone to participate in these behaviors sequentially; one replacing functions of the other. In the recovery movement, substitute addictions have been addressed as an issue about which persons in recovery should be vigilant (e.g., http://www.wikihow.com/Get-Sober-with-a-12-Step-Program; accessed on 5-21-2007). For example, the popular recovery movement catch phrase of "13th Stepping" may reflect the tendency to replace one's drug of choice with sexual compulsion. Some authors have even argued that 12-step programs function as a substitute addiction (Buddy, 2003; Galaif & Sussman, 1995), albeit more safe than involvement in many harmful alternatives. The creators of Gamblers Anonymous and Sex Addicts Anonymous were abstinent alcoholics that resorted to a second addictive process, leading to 12-step programs dealing with these substitute addictions (Sussman & Ames, 2001). Also, it may not be surprising that the co-founders of Alcoholics Anonymous both died of smoking-related diseases (Sussman & Ames, 2008). Smoking and sexual behavior also have been depicted as substitute addictions for each other or other drugs, perhaps reflecting similar functions such as relaxation or escape (Sussman, 2005).

Horvath (2006) discusses several parameters of substitute addictions. On the one hand, some replacement behaviors may seem relatively adaptive to the addict (e.g., eating celery or carrots for desert instead of chocolate cake, smoking marijuana instead of using cocaine, exercising excessively rather than drinking alcohol). For example, recovering alcoholics and other substance abusers often report the belief that the Internet is a safe substitute to subdue their cravings and avoid relapse (Young, 1999). Moreover, some cocaine-addicted people may attempt natural recovery with potentially healthy substitutions such as religion, volunteer work, formal education, and interpersonal relationships (Chiauzzi & Liljegren, 1993; Shaffer & Jones, 1989). Some substitutes that may cause dependence, such as methadone maintenance treatment and Alcoholics Anonymous membership, may be associated with lower relapse rates among alcoholics and heroin addicts (Valliant, 1988).

Even though engaging in a substitute addiction allows the addictive pathway to remain functional, this substitute may, over time, permit a "weakening" of the original (hopefully worse) addiction. The substitute addiction also may then be eliminated or channeled into a healthy and moderate level of behavior (Horvath, 2006) that could not be reached with the more intense/harmful addiction. This redirection, perhaps described by the phrase "All things in moderation," or self-regulation of lifestyle maintenance functioning (Brisman & Siegel, 1984), entails in itself much needed conceptual understanding and research.

SUBSTITUTE FUNCTIONS OF SUBSTANCE AND PROCESS ADDICTIONS

Substitute addictions may produce similar positive sensations in the mesolimbic dopamine system, associated with reward. The reward system may function in part by a substance or process stimulating the nucleus accumbens, perhaps creating desired subjective feelings such as a "rush" or "high" (Julien, 1998). Kelley and Berridge (2002), focusing on drugs, discuss three ways that drugs can impact the reward system to produce addiction. First, drug rewards might activate and reinforce the same brain systems as intense natural rewards that bring pleasure. Second, drugs may distort reward processes, disrupting normal reward function while enhancing "wanting," leading to habitual drug consuming behavior. Thus, drugs are increasingly desired while the capacity to make rationale judgments about future consequences of sustained drug use becomes progressively impaired (Robinson & Berridge, 2000). Third, addictive drugs may bring about new brain processes, such as negative withdrawal states, which play a role in perpetuating the addiction.

It is possible that different types of substance and process addictive behaviors can:

a. overlap on psychopharmacological effects including pleasure;
b. distort reward processes; and
c. produce negative withdrawal-like states (e.g., cravings, irritability).

Various substance and process addictions have the capacity to directly or indirectly alter neurotransmitter function, particularly mesolimbic dopaminergic turnover (Hardie, 2002; Mani, Mitchell, & O'Malley, 2000; Sussman & Ames, 2001). For example, cigarette smoking, other drug use, overeating, gambling, and sexual behavior may activate dopamine transmission in the nucleus accumbens, and repeated exposure to these addictive behaviors may sensitize dopamine response (Bradley & Meisel, 2001; Gautier et al., 2000; James, Guo, & Liu, 2001; Lindsay & Rainey, 1997; Roy et al., 1988; Sussman, 2005). Interestingly, some researchers have conjectured that excessive work increases adrenalin turnover (and perhaps, dopamine), which can produce pleasurable feelings; an influence that may become addictive (Fassel, 1992). This may serve as one explanation why pathological gamblers, when not gambling, may be workaholics (APA, 2000). Since exercising may stimulate endorphin turnover (and maybe dopamine) (Sussman & Ames, 2001), other drugs that provide a similar function (opiates) may be used once exercise is not a viable option (e.g., injury).

Several similarities in distortion of reward processes have been reported between compulsive gambling and drug abuse. For example, the changes in states of arousal and euphoria sought by gamblers seem similar to the high obtained from using drugs. Compulsive gamblers tend to increase the size of their bets or the odds against them to increase excitement, analogous to drug tolerance effects (Spunt, Dupont, Lesieur, Liberty, & Hunt, 1998). Likewise, researchers also have found the equivalence of drug withdrawal symptoms exhibited in compulsive gamblers (e.g., irritability, depressed mood, and obsessive thoughts). These types of effects also exist among sex addicts (Sussman, 2007). Much more research is needed pertaining to these and other addictive behaviors.

SUBSTITUTE ADDICTION EMPIRICAL RESEARCH: NOT MUCH

We identified little empirical research on this topic. A search of Google Scholar revealed 27 Web pages that relevantly pertained to the term "substitute addiction" (search conducted on 5-21-2007). A search of OvidMEDLINE (1950-May week 1, 2007) and PsycINFO revealed only two articles each that pertained to this topic. Further, the number of data-driven empirical articles is even fewer in number. A search for the terms "compensatory addictive behaviors" or "secondary addiction" yielded no new results.

Of this existing research, some researchers propose overeating to be a likely substitute addiction for drug abuse (James et al., 2004; Kleiner et al., 2004). In fact, in one study, these authors found patient reports indicating a notable functional replacement of alcohol abuse by overeating (Kleiner et al., 2004). Conversely, some people substitute drugs to reach an intoxicated state to achieve the sense of release and abandonment of control previously experienced with

bulimia (Zweben, 1987). Similarly, bulimia nervosa has been posited as a means of symptom substitution for substance abuse (Brisman & Siegel, 1984).

Murphy and Hoffman (1993) found that up to 25% of their sample of alcoholics who had maintained at least one year of sobriety substituted new addictions such as eating desserts, smoking cigarettes, and working extended hours, to replace their previous alcohol use behaviors for up to 36 months post-abstinence. These researchers mentioned that these new behaviors appeared to be common, or even tolerated, aspects of early recovery until life processes were normalized. Likewise, Vaillant (1983) found that alcoholics remitted to treatment utilized chain smoking, compulsive work, or benzodiazepines as their major replacement methods. Friend and Pagano (2004) examined the substitute addiction process in patients being treated for alcohol dependence, and found that 15% of patients initiated smoking during treatment for the first time, and 54% of that group continued to smoke 12 months after treatment, during which their tobacco use increased over time. Moreover, former smokers were particularly susceptible to return to heavy tobacco use during their alcohol treatment. Similarly, Mansky (1999) found that in a New York State recovery program for physicians, gambling, eating disorders, sex, excessive exercise, workaholism, and overspending were observed to be substitute addictions for alcohol and drug abuse.

Substitute addictions specific to narcotic abuse have been identified. These include marijuana, chloriazepoxide (i.e., a benzodiazepine which increases sleepiness, muscle relaxation, and reduces anxiety), religion, food, participation in Alcoholics Anonymous, obsession with possessions, and alcohol (Vaillant, 1966). The proscribed use of anti-anxiety agents such as benzodiazepines, which are effective for anxiety, has been noted as being problematic in addiction treatment due to a high potential for abuse and conversion into a substitute addiction (Zweben, 1987).

GATEWAY MODEL AS AN EXAMPLE OF SUBSTITUTE ADDICTION

While there is scant literature on the concept of substitute addictions, other terms arguably are examples of this concept. For example, the Gateway Model has been one of the dominant paradigms in the etiology of drug abuse (Ellickson, Hays, & Bell, 1992; Kandel, 2002; Kandel & Faust, 1975; Yamaguchi & Kandel, 1984), and may be a possible explanation for substitute addictions. This model illustrates a sequential process whereby substance use behavior begins with relatively socially acceptable drugs and then advances to "hard" drugs (e.g., from alcohol to cocaine use). The gateway hypothesis consists of three interrelated ideas about drug use: sequencing, initiation, and causation (Kandel, 2003). Sequencing implies that there is a fixed relationship between two substances, such that one substance is consistently initiated before the other. Initiation implies that beginning one substance increases the likelihood of initiation of a second

substance. Causation implies that use of the first substance causes use of the second substance. Kandel (2003) emphasizes that entry into a specific drug use stage is common and perhaps necessary, but is not a sufficient requirement for entry into the next higher drug use stage. One may conjecture that the Gateway Model could be expanded to include a variety of addictive behaviors, including process addictions, and not just substance use. Much research is needed in this regard.

HARM REDUCTION AS AN EXAMPLE OF SUBSTITUTE ADDICTION

Certainly, the notion of substitute addiction is consistent with harm reduction principles if less harmful addictive behaviors are engaged in, and can direct the addict away from his or her more injurious drug of choice (Levi & Borne, 2002). Early harm reduction practices can be traced back throughout history (Sussman & Ames, 2008). One relatively recent example pertains to the origins of methadone maintenance treatment (MMT) where two doctors in the United States, Dole and Nyswander, maintained that opiate dependence produced a metabolic disorder that was best managed by an orally administered synthetic substitute known as methadone, which could lead to an addiction easier to treat than opiates (Hunt, 2003; Rosenberg, Melville, & McLean, 2002).

Interestingly, alcohol has been recognized as a substitute addiction among recovering opioid addicts, especially among those that completed an addiction program (De Leon, 1987). This type of alcohol use among former opioid addicts and those with eating disorders has been a source of clinical concern (e.g., De Leon, 1987; Zweben, 1987). De Leon asserted, however, that the shift to alcohol use in his study did not appear to be a harmful substitute dependency since there were few re-entries into drug or alcohol treatment programs and daily use of alcohol/marijuana was low (frequency was one to three times per week). Perhaps, alcohol may serve as a harm reduction behavior, though one may speculate that continued alcohol use might become a harmful substitute addiction for former opioid addicts.

SUBSTITUTE ADDICTION IMPLICATIONS FOR PREVENTION EDUCATION AND TREATMENT

Much research is needed on substitute addictions to assist in the development of appropriate prevention and treatment strategies. Even though the condition has been acknowledged and cautioned by clinicians (e.g., Horvath, 2006), information on the relative importance of substitute addiction in comparison to other patterns of addictive behavior is limited (see discussion on other patterns of addictive behavior later in this article). Common patterns of substitute addictions used (e.g., perhaps from alcoholism to compulsive gambling) and their relative

health-related impact also need to be identified in future research. Perhaps population-based prevalence and incidence studies will provide insight into the breadth of the problem. Longitudinal investigations of the processes and routes of substitute addiction may be instructive on determining its functional and behavioral differences from harm reduction and gateway models of substance use. Finally, studies are needed to understand the person-environment factors that contribute to this process. These studies will possibly lead to more appropriate prevention and treatment programs for substitute addictions. That being said, one may speculate on potential prevention and treatment strategies, as follows.

Prevention

It is possible that people learn to manipulate pleasure-related neurotransmission at a young age through behaviors that may or may not be healthy (Sussman & Unger, 2004). For example, some behaviors that are unhealthy among children (e.g., eating fried food, drinking caffeinated beverages, excessive masturbation) may precede the use of recreational drugs (e.g., cigarette smoking, alcohol use), and possibly act as earlier substance or process addictive behaviors (Collins, Graham, Rousculp, & Hansen, 1997; Sussman, 2005; Sussman et al., 1995). Perhaps these initial addictive behaviors provide similar neurotransmission effects, and begin a cognitive set and chain of behaviors that involve exploring different ways of manipulating moods and inducing pleasure, regardless of outcomes. For example, delaying and/or reducing adolescent early exposure to caffeine (a mood-altering legal psychoactive stimulant) may be protective against addictions, because of its association with alertness, difficulty sleeping, and possible mood elevation (Fulkerson, Sherwood, Perry, Newmark-Sztainer, & Story, 2004; Orbeta, Overpeck, Ramcharran, Kogan, & Ledsky, 2006)—a possible prelude to substitute substance use to alter these same physiological outcomes. In addition, teens may be increasingly the target market for high-caffeine containing coffee and energy drinks, often delivered by sponsors who promote messages such as the benefits of weight loss and increased endurance (e.g., "Cocaine Energy Drink" recently entered the beverage market; Associated Press, 2006).

Preventive education may play an important role in preventing and counteracting developing dysfunctional cognitive processes and behavior chains. School based prevention education programs that target both adolescents and parents may be helpful. These programs can inform students about the addictive effects of caffeine (e.g., caffeine headache) and potential for substitute addiction, media influences on caffeine use, and potentially demonstrate that most youth do not approve of or do not use caffeine as young teens or preteens. Parent education to increase monitoring of their child's beverage consumption might also be provided. School policies may also be needed to regulate caffeine availability on school grounds. Policies that attempt to deter caffeine use among youth may be attempted as part of a larger political-environmental change.

In addition, prevention programs that help adolescents develop healthy emotional processing skills might provide them the tools to make health-conscious decisions, and bypass reliance on substances to feel alert or feel good. Also, school and youth agencies might continue to promote and enhance exercise and team programs (i.e., sports) as one may conjecture that these activities might be protective against substance use initiation. These behaviors may lead to a natural physiological "high" such as those reported by runners and sports players. Youth may be able to rely on these prosocial behaviors as a means of coping and recreation. However, the addictive patterns of these activities may need to be monitored and their negative consequences prevented (Sussman & Ames, 2001).

Treatment

Clinical treatment implications may include a need to weigh the costs and benefits of a newly acquired addiction occurring during the treatment process. For example, clinicians may attempt to calculate whether or not a recovering cocaine addict who now smokes cigarettes or becomes a workaholic as a form of recovery has fewer health (i.e., psychological, physical) and functional problems (i.e., family, social, financial, vocational, etc.) than what the preceding cocaine addiction caused. Such a harm reduction practice may be useful for some patients since substitute addictions could be a step in the right direction, as they may be transitory and can condense the process of change into more controllable steps (Horvath, 2006). The underlying tenet is that once the original cravings weaken, it becomes easier to deal with cravings for the substitute substance or process. However, considering this viewpoint, Horvath (2006) proposes that the original addiction is not surmounted until both the original and substitute addiction cravings have dissipated, or are easily coped with. Therefore, treatment may need to instruct how to fade off of the substitute addiction, either proactively or later on in treatment. One may speculate that instruction in moderation management of alternative prosocial behaviors may be of assistance.

Alternatively, it may be useful to develop programming to prevent functional replacement of one addictive behavior by another among persons in recovery (Sussman et al., 2005). If this tact is taken in the treatment context, it is important that the clinician monitor a variety of potential addictive behaviors, not just the addiction being treated. This can help the patient and practitioner become aware of possible underlying problems (e.g., dysphoric feelings) leading to a higher quality of recovery (instruction in emotional coping for substitute addictions; Horvath, 2006; Mansky, 1999). Of course, some aspects of treatment for one addiction (e.g., use of pharmacologic adjuncts for smoking cessation) may not generalize to a substitute addiction (e.g., gambling; Melnick, De Leon, Thomas, & Kressel, 2001; Murphy & Hoffman, 1993). Thus, treatment planning would need to be multifaceted. Motivational interviewing (Miller & Rollnick, 1991) techniques may be useful to explore shared (or unique) underlying aspects of different addictions and receptivity to different treatment facets.

SUBSTITUTE ADDICTION AS ONLY ONE PATTERN OF ADDICTIVE BEHAVIOR

Substitute addictions may not be relevant to all persons in recovery. To identify when and for whom this concept applies is a challenge. For example, some addicts appear to recover without an obvious substitute addiction. Alternatively, some addicts may involve themselves in multiple addictions simultaneously, perhaps adding one addictive behavior to another over time, without apparent functional replacement occurring. For example, pathological gamblers report higher rates of alcoholism and other drug misuse than that of the general population (Spunt, Lesieur, Hunt, & Cahill, 1995). In one study, 59% of the pathological gamblers reported using heroin, almost half reported using alcohol, and 23% reported using cocaine more than 50% of the time or always while gambling (Spunt et al., 1998).

Other examples of concurrent multiple addictive behaviors are identified in the literature. Compulsive spenders are relatively likely to suffer from drug abuse, eating disorders, and pathological gambling (e.g., Schlosser, Black, Repertinger, & Freet, 1994). Co-morbid alcohol and nicotine addictions are widespread and provide evidence to the overlap between genetic, behavioral, and neuro-chemical factors (Li, Volkow, Baler, & Egit, 2007; Sussman & Ames, 2001). Therefore, some behaviors may not serve as substitutes for a previous behavior, but rather as concurrent interactions with each other.

CONCLUSIONS

Some people may engage in concurrent multiple addictions, others may alternate between substances or behaviors, and still others may initiate a totally new, or partake in a more intense form of the old addiction (e.g., Rand, Lawlor, & Kuidau, 1986). One can't assume automatically that a substance and/or process abuser will replace his or her addiction with a substitute behavior. This article only serves as a first step in promoting more attention to this arena. Certainly, many patterns of addictive behavior occur over time within different addicts. Yet, a substitute addictive behavior is a pattern noted widely by clinicians but grossly under-researched. Much research is needed to better understand the prevalence, operation, and treatment of substitute addictions.

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