

Self-Schemas as Cognitive Foundations for Impaired Problem Recognition
in Alcohol Use Disorder
by
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DEDICATION

This dissertation is dedicated to my two loving and patient little sons, Sebastian and Adrian. You are my sunshine through the tough times, keep me motivated when I am tired, and always give me love, laughter and joy.

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ABSTRACT

Self-Schemas as Cognitive Foundations for Impaired Problem Recognition in Alcohol Use Disorder

by

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Background: Impaired problem recognition (IPR) has been identified as the primary barrier that must be overcome in order for alcohol use disorder (AUD) treatment and recovery to be successful. However, the cognitive mechanisms undergirding IPR continue to remain poorly understood. The Self-Schema Model of the Self-Concept has the potential to identify the structural and functional properties of neurocognitive networks undergirding IPR and drinking behavior. The purpose of this cross-sectional correlational study was, first, to determine the availability of a drinking-related self-schema among individuals who met criteria for moderate to severe alcohol use disorder, in accordance with the Diagnostic and Statistical Manual for Mental Disorders, 5th Edition. In the presence of a drinking-related self-schema, subsequent goals were to 1) identify structural properties (i.e., valence and elaboration) and, 2) establish relationships between these structural properties and IPR. **Methods:** The sample consisted of 55 men and

women, over the age of 21, recruited from sobriety courts, public advertisements, and personal referrals in a Midwestern state. Participants completed measures related to alcohol use, the self-concept, problem recognition, and treatment-seeking. Data were analyzed using descriptive statistics, Pearson product-moment correlation, and multiple regression. **Results:** All participants displayed availability of a drinking-related self-schema comprised predominantly of negatively valenced content. Elaboration of the drinking-related self-schema was negatively correlated with taking steps toward recovery ($r = -.35, n=55, p<.01$) and positively correlated with frequency of drinking ($r=.41, n=55, p<.01$). Negative valence was positively correlated with problem recognition ($r = .49, n=55, p<.01$) and ambivalence ($r = .34, n=55, p<.05$). Positive valence was negatively correlated with problem recognition ($r = -.40, n=55, p<.01$). Elaboration and valence of a drinking-related self-schema predicted impaired problem recognition (R^2 adjusted=0.37, $F(8,46)=4.99, p<.001$). Elaboration of a recovery-related self-schema predicted taking steps toward modifying drinking behaviors (R^2 adjusted=0.46, $F(8,46)=6.81, p<.001$). Elaboration of a recovery-related self-schema and elaboration of a drinking-related self-schema predicted frequency of drinking (R^2 adjusted=0.24, $F(4, 50)=5.17, p<.001$).

Conclusion: Findings suggest that structural properties of a drinking-related self-schema influence problem recognition, drinking, and recovery behaviors. Therapeutic interventions directed toward modifying valence and elaboration of drinking-related self-schemas may offer promising new treatment options for alcohol use disorder.

CHAPTER ONE

INTRODUCTION

"The self is more than one other object in the psychological field. It has the unique property of being both the subject and object of experience; it is for us both the source and end of experience." (Asch, 1952, p. 287)

Nursing Science

The ideal relationship between nursing theory and research has been described as a double-helix, beginning and ending in nursing practice (Reed, Shearer & Nicoll, 2004). Theory is one helix from the conception of an idea through modifications and extensions to eventual confirmation or refutation, while research is the second helix, spiraling from identification of research questions through data collection and analysis to interpretation of findings and recommendations for further study. The core of the double helix is the pairing of theory development with the research process. In the core, theory directs research and research findings shape the development of theory (Fawcett, 1978). The dissertation contained within these chapters is rooted firmly within this idea for nursing research, and displays the intricate relationship between nursing practice, theory and research.

The Phenomenon of Impaired Problem Recognition

Practice. The concept of impaired problem recognition (IPR) was first mentioned and explored within the psychological literature by Anna Freud in 1936, and has been intriguing theoreticians, clinicians and researchers ever since (Denzin, 1993; Freud, 1936; Freud, 1961; Livneh, 2009; Paredes, 1974; Prochaska & DiClemente, 1982; Wheeler & Lord, 1999; Wilson,

1987). Despite nearly 100 years of research into the phenomenon, the cognitive origins of impaired problem recognition continue to remain unclear.

Impaired problem recognition is defined as an inability to recognize that addiction-related behaviors are causing financial, social or emotional dysfunction in one's life, and a lack of intention to change addiction-related behavior in the foreseeable future (Denzin, 1993; Dorpat, 1983; Duffy, 1995; Goldstein et al., 2009; Manouosos & Williams, 1998; Prochaska & DiClemente, 1982; Rinn, Desai, Rosenblatt, & Gastfriend, 2002; Tarter, Alterman, & Edwards, 1984; Wing & Hammer-Higgins, 1993). Impaired problem recognition is a significant and prevalent problem within alcohol use disorder (AUD). It is estimated that of the more than 18.5 million Americans who currently meet diagnostic criteria for an alcohol use disorder, only 8.5% of people will receive treatment for an AUD and only 2.8% identify that they need treatment for an AUD (Substance Abuse and Mental Health Association, 2011).

Alcohol use disorders have been associated with substantial, negative health, social and economic consequences for both the individual and society (World Health Organization, 2004). In order to stem these consequences impaired problem recognition must be overcome. Impaired problem recognition has been identified as the primary barrier to treatment seeking and to the successful recovery from AUD (Allan, 1991; Edlund, Booth, & Feldman, 2009; Goldsmith & Green, 1988; Hedden & Gfroerer, 2011; Howard et al., 2002; Miller, 2001; Stewart & Connors, 2007; Verdejo-Garcia & Perez-Garcia, 2008; Wing, 1995; Wing, 1996).

Theory. Although there is relative consensus across the addictions literature that impaired problem recognition is the result of disturbances within cognitive processing, little is known regarding the neurological structures and functioning that create these disturbances. Current models of impaired problem recognition within AUD remain highly abstract and general

in nature (Denzin, 1993; Dorpat, 1983; Hull & Schnurr, 1986; Tarter et al., 1984; Wing & Hammer-Higgins, 1993). Moreover, despite recent advancements in neurocognition, much of the literature exploring impaired problem recognition is dated with little theoretical development within the field since the early 1990's.

However, the Self-Schema Model of the Self-Concept has the potential to offer a contemporary, more concise understanding of the neurocognitive structures and processes that result in impaired problem recognition. Therefore, grounded within the Self-Schema Model of the Self-Concept the overall purpose of this dissertation was to identify the neurocognitive structures that undergird impaired problem recognition, in order to lay the foundation for the future development of neurocognitive interventions focused on improving impaired problem recognition within AUD.

This dissertation is structured in a three paper format, and consists of five chapters. Chapter one provides a brief introduction to the overall topic of impaired problem recognition within AUD. Chapters two, three, and four are written as complete manuscripts that are independently publishable. Chapter five briefly summarizes the dissertation's major findings and proposes the next steps in developing theoretically and empirically grounded neurocognitive interventions for addressing impaired problem recognition in AUD.

Dissertation Manuscripts (Chapters Two, Three and Four)

Research. Chapter Two consists of the first manuscript, titled *Self-Schemas in Alcohol Use Disorder: An Integrative Review of the Literature*. The purpose of the integrative review was to synthesize the existing research concerning self-schemas within AUD, in order to better understand the structural properties and function of the drinking-related self-schema within AUD. The following questions guided the review:

1. What is known about the availability, structure and effect of the drinking-related self-schema among persons with an AUD?
2. How are drinking-related self-schemas operationalized within the health and psychosocial literature?

In this manuscript, the Self-Schema Model of the Self-Concept (Markus, 1977; Stein, 1995) is presented in detail, including outlining the structural properties of the self-concept and identifying the relationship between the structural properties of the self-concept and self-perception and behavior, thereby demonstrating the model's utility in understanding the phenomenon of impaired problem recognition. The available literature pertaining specifically to drinking-related self-schemas is critiqued and synthesized, in order to identify what is currently known regarding the structural properties and effect of the drinking-related self-schemas, as well as to inform the model proposed within Chapter three and hypotheses proposed within Chapter four.

Chapter three consists of the second manuscript, titled *Problem Recognition in Alcohol Use Disorder: Proposal of a Self-Schema Model*. The purpose of this review was to bridge what is known regarding the structural properties of drinking-related self-schemas with the phenomenon of impaired problem recognition, by proposing the Self-Schema Model of Impaired Problem Recognition (SSM-IPR). The SSM-IPR is grounded within the Self-Schema Model of the Self-Concept and supported with results from the integrative review detailed in Chapter Two and the existing body of addictions research. The report also provides a detailed discussion of the health, social, and economic consequences of untreated AUD on both the individual and society. In addition, it discusses the significant role that impaired problem recognition plays in

treatment seeking and treatment outcomes, emphasizing the need for effective interventions to improve impaired problem recognition.

Chapter four consists of the third manuscript, presenting a cross-sectional correlational study titled *Self-Schemas as the Cognitive Foundations for Impaired Problem Recognition in Alcohol Use Disorder*. Within the manuscript the Self-Schema Model of Impaired Problem Recognition is used to formulate hypotheses about the structural properties and effect of the drinking-related self-schema, which are then empirically tested. The purposes of the study were to 1) identify the structural properties (availability, valence, and elaboration) of the drinking-related self-schema; and 2) determine the relationship between the structural properties of the drinking-related self-schema and problem recognition among individuals who met Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) (American Psychological Association, 2013) criteria for moderate to severe AUD.

In sum, this dissertation, 1) establishes that impaired problem recognition within AUD persists as a significant health and societal issue that needs to be addressed; 2) synthesizes and critiques the existing self-schema literature within the domain of alcohol, identifying current gaps and limitations in the understanding of the neurocognitive structures undergirding AUD and impaired problem recognition; 3) presents the Self-Schema Model of the Self-Concept as a means of identifying the neurocognitive structures and functioning of the self-concept that influence self-perception and behavior; 4) proposes the Self-Schema Model of Impaired Problem Recognition to advance understanding of the neurocognitive processes specifically undergirding impaired problem recognition; and 5) empirically determines the structural properties of the self-concept that result in impaired problem recognition, lending support for the proposed

Self-Schema Model of Impaired Problem Recognition and direction for the development of future interventions addressing impaired problem recognition in AUD. True to the double helix paradigm, the research presented within the chapters to follow stems from the clinical nursing problem of impaired problem recognition. The existing body of addictions research and existing theory is then used to shape the development of the SSM-IPR, which was then tested and supported with research. Results from this dissertation will be brought back to clinical practice by creating clinically relevant and feasible interventions. This budding program of research illustrates how nursing research and theory are rooted in practice, and inextricably intertwined with theory-directing research, research-informing theory, and the results informing the profession of nursing.

Contribution to Nursing Science. The research presented within this dissertation adds to the nursing and addictions literature by being the first body of work to identify the neurocognitive structures that undergird impaired problem recognition within AUD, and provides needed direction for the development of effective interventions addressing impaired problem recognition within AUD. It also lays a solid foundation for the development of greatly needed, empirically and theoretically grounded nursing interventions to address impaired problem recognition within AUD.

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CHAPTER TWO

SELF-SCHEMAS IN ALCOHOL USE DISORDER: AN INTEGRATIVE REVIEW OF THE LITERATURE

Introduction

The self-concept has long been recognized as playing a crucial role in regulating health behaviors (Beland, 1970; Burgess, 1978; Mitchell, 1973; Oyserman, Fryberg, & Yoder, 2007; Stein & Corte, 2007; Stein & Corte, 2008) and has recently become a promising new target for health, behavioral, and psychotherapeutic intervention (Avants, Beitel, & Margolin, 2005; Oyserman & Destin, 2010; Oyserman et al., 2007). Much of this burgeoning interventions research has been grounded in the Self-Schema Model of the Self-Concept. The Self-Schema Model of the Self-Concept is a middle-range theory developed to explain the neurocognitive mechanisms that form the overall self-concept (Markus & Wurf, 1987; Markus, 1977). The model addresses the structural and functional properties of the self-concept and provides a means for studying how properties of current and future-oriented self-conceptions influence self-perception and behavior (McConnell & Strain, 2007; Oyserman & James, 2009; Stein & Corte, 2008).

Self-schemas have received increased attention as favorable targets for therapeutic intervention because of the central role that they play in influencing self-perception and behavior (Avants & Margolin, 2004; Avants, Margolin, & McKee, 2000; Kendzierski & Costello, 2004; Margolin, Beitel, Schuman-Olivier, & Avants, 2006; Oyserman, Bybee, & Terry, 2006; Shadel, Niaura, & Abrams, 2000). For example, Avants and Margolin (2004) found that the habitual

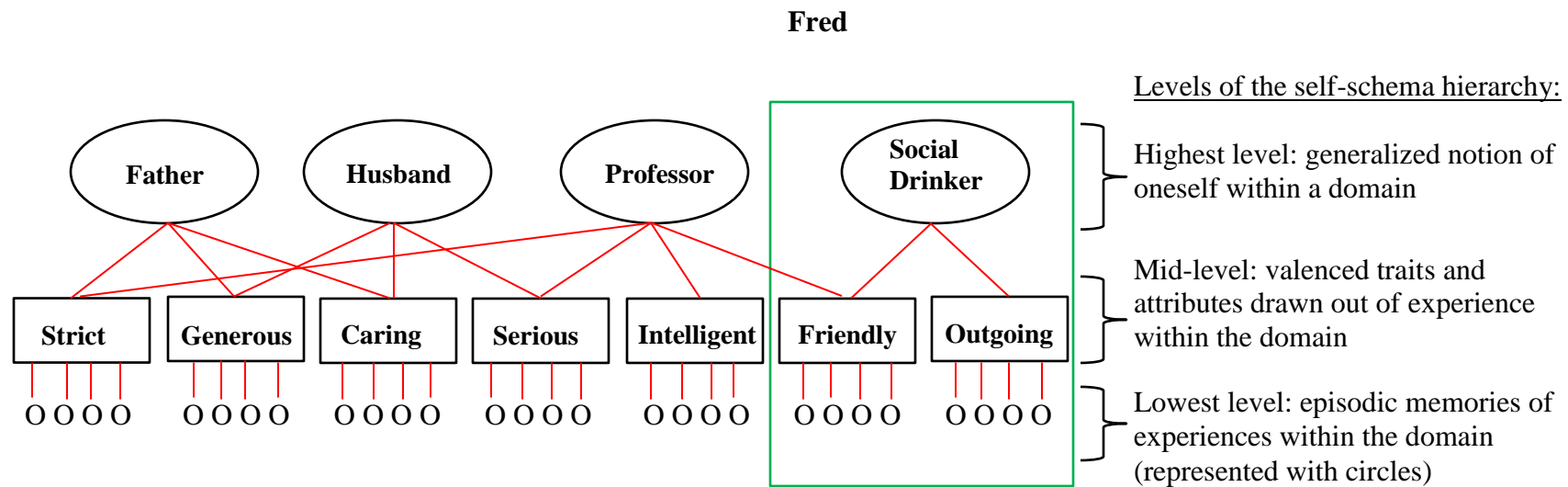
activation of an addict self-schema within a sample of 38 HIV-positive, injection drug-using men and women experiencing heroin addiction, resulted in further elaboration or strengthening of the schema. It was determined that increased elaboration of the addict self-schema had the effect of increasing the high-risk behaviors of substance use and risky drug-taking practices (Avants & Margolin, 2004; Margolin et al., 2007). In order to reduce the use of heroin and risk-taking behavior, the authors proposed Spiritual Self-Schema (3-S) therapy, which focused on assisting participants to elaborate a self-schema for abstinence and harm-prevention that conflicted with their substance-use-related schema. The authors found that the elaboration of a conflicting self-schema resulted in decreased reliance upon the “addict” schema, and ultimately resulted in decreasing elaboration of the schema, substance use, and risk-taking behavior (Avants et al., 2000; Margolin et al., 2006). Despite the development of promising schema-based interventions within multiple health-related fields, such interventions remain unexplored within the domain of alcohol use disorder (AUD). The first step in bringing schema interventions research into the field of AUD, and developing theoretically supported and empirically grounded interventions for addressing these, is identifying the structural properties and functioning of drinking-related self-schemas.

The Self-Schema Model of the Self-Concept posits that the self-concept is comprised of multiple domain-specific, self-referential, neurological networks called *self-schemas*. The *structure* of each schema is hierarchically organized with a generalized notion of one’s self within a specific domain at the highest level, attributes descriptive of one’s self within the domain at the mid-level, and episodic memories of personal experiences within the domain at the lowest level of the hierarchy (Cantor & Kihlstrom, 1989; Markus & Wurf, 1987; McConnell, Rydell, & Brown, 2009). See Figure 1 for a depiction of the structure of the self-concept. The

content of a self-schema refers to the generalized notion that one has of himself or herself within the domain, the attributes that support that generalized notion, and episodic memories of experiences encountered within the domain. *Availability* of a self-schema refers to the presence or absence of a domain-specific self-referential knowledge structure (Higgins, King, & Mavin, 1982; Stein, 1995). If a self-referential knowledge structure is present and detectable within working memory, then the schema is deemed available (Stein, 1995).

The structure of the mid-level of the hierarchy has been identified as particularly influential in guiding self-perception and behavior (Markus & Wurf, 1987; McConnell, Rydell, & Brown, 2009; Schleicher & McConnell, 2005). The Self-Schema Model of the Self Concept proposes that the mid-level of a self-schema hierarchy is composed of positively and negatively valenced traits and attributes. *Traits* refer to distinguishing characteristics or qualities of one's personal nature or personality, for example “outgoing”, while *attributes* more broadly refer to features regarded as a characteristic of someone, for example behaviors, affective responses, and physical characteristics, as well as other information that is descriptive of one's self within a particular context (Schleicher & McConnell, 2005).

Figure 1. *Depiction of the self-concept for a hypothetical person named Fred, illustrating the structural and functional properties of the self-concept*



Ovals represent the highest level of the self-schema hierarchy, the generalized notion of one's self within a domain of experience. The rectangles represent the mid-level, comprised of personal traits and attributes drawn out of one's experiences within the domain. The circles represent the lowest level of the hierarchy, episodic memories of personal experiences within a domain. The figure depicts the *availability* of four self-schemas (Fred's father schema, husband schema, professor schema, and his drinking-related schema). The green box encompasses the *content* of one domain-specific *self-schema* (his drinking-related self-schema). *Elaboration* is depicted by

the number of traits and attributes supporting a domain-specific self-schema and red lines linking self-schemas based upon redundant traits and attributes. Model is adapted from McConnell & Strain (2007) and Stein (1995).

Markus and Kunda (1986) found that the working self-concept was informed by only a portion of the overall number of self-schemas that one possesses at any given time, with some self-schemas being chronically activated in working memory, and other less fully elaborated self-conceptions fluctuating in their accessibility in response to the current social context. A number of researchers agree the more elaborate a self-schema, the more likely it is to be part of the working self-concept, and thus influence cognitive processing and behavior (Markus & Kunda, 1986; Markus & Kitayama, 1991; McConnell, 2010; McConnell & Strain, 2007; Oyserman, 2007; Schleicher & McConnell, 2005; Shadel, Niaura, & Abrams, 2000).

Elaboration is consistently used within the schema literature to refer to the degree of influence a schema has on information processing or on the overall self-concept, based upon its structural properties (Markus & Kunda, 1986; Markus & Kitayama, 1991; McConnell, 2010; McConnell & Strain, 2007; Rafaeli-Mor & Steinberg, 2002; Scott, 1969). It is most often operationalized as the total count of attributes supporting the domain-specific self-schema (McConnell & Strain, 2007; Renaud & McConnell, 2002). Thus, the self-schema literature identifies the structural properties of self-schemas (consisting of elaboration, and valenced content), as the key elements of the self-concept that influence self-perception and behavior.

This integrative literature review was conducted to synthesize the existing research concerning self-schemas with AUD, in order to better understand the structural properties and functions of drinking-related self-schema within AUD. The following questions guided the review:

1. What is known about the availability, structure, and effect of the drinking-related self-schema among persons with an AUD?

2. How are drinking-related self-schemas operationalized within the health and psychosocial literature?

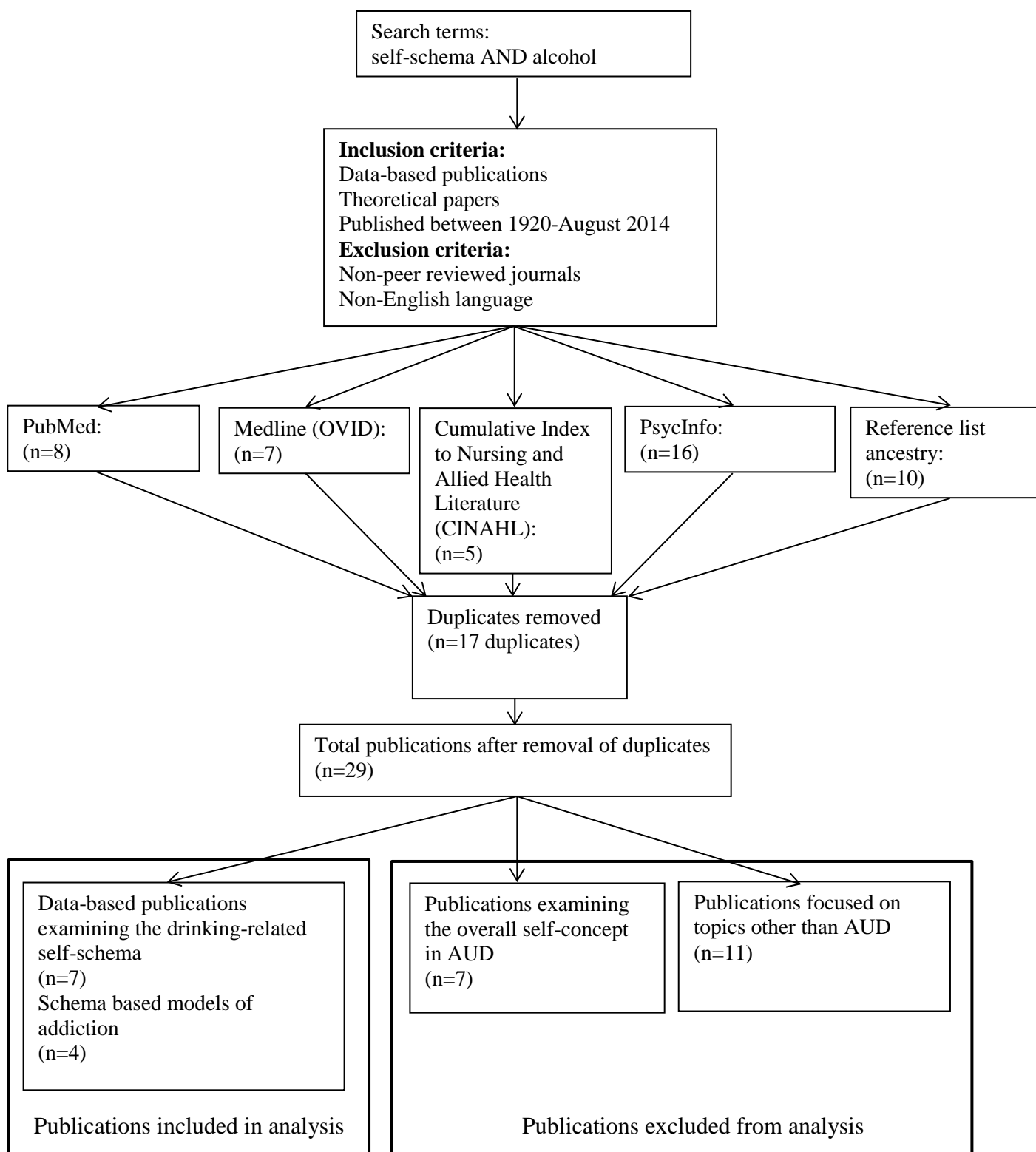
Methods

Search Strategy

This integrative review identified, retrieved, and graded the existing literature pertaining specifically to self-schemas within AUD. A search of the literature was conducted utilizing the methodological approach outlined by Russell (2005). PubMed, Medline (OVID), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PsycInfo databases were searched for data-based studies published from 1920 to August, 2014. Keywords were *self-schema* AND *alcohol*. Search terms were broad in order to maximize the number of publications retrieved. In addition, reference lists of retrieved publications were reviewed for relevant studies.

Inclusion and exclusion criteria. Inclusion criteria for this review were data-based studies published in peer-reviewed journals or books, and theoretical publications, with drinking-related self-schemas as the primary topic. Articles in a language other than English were excluded. A flowchart detailing the complete search strategy, including the number of included and excluded publications, is detailed in Figure 2.

Figure 2. Flow chart of literature search and exclusion process



Measures and Analytic Strategy

Retrieved publications were divided into the categories of data-based primary research studies, and models of addiction, as detailed in Table 1. Primary research studies were critiqued using study purpose, study design, study sample, and operationalization of self-schemas. In addition, individual studies were assigned a grade for rigor and quality of *good*, *fair* or *insufficient*, using Polit and Beck's (2003) system for grading the strength of evidence. The overall body of literature was graded using Grimes and Schulz's (2002) methodology for grading a body of literature. The rigor and quality of the retrieved models of addiction was graded using Fitzpatrick and Whall's (2005) criteria for evaluating conceptual models. The results of the data-based primary research studies were compared and synthesized. The existing models of addiction were then outlined and evaluated with regard to model purpose and key postulates.

Table 1

Peer-reviewed publications and models pertaining to the Self-Schema Model of the Self-Concept in addictions, retrieved by search strategy

Data-based studies examining the drinking-related self-schema (n=7)	Schema based models of addiction (n=4)	Publications examining the overall self-concept (n=7)	Publications focused on topics other than AUD (n=11)
1. Casey & Dollinger (2007)	1. Avants & Margolin (2004)	1. Corte (2007)	1. Avants & Kelly (2005)
2. Corte & Stein (2007)	2. Brown (1996)	2. Corte & Zucker (2008)	2. Avants et al. (1993)
3. Dollinger et al. (1993)	3. Denzin (1993)	3. Pilling & Brannon (2007)	3. Avants, Margolin & Kosten (1996)
4. Gray et al. (2011)	4. Galanter (2014)	4. Stein, Roeser & Markus (1998)	4. Avants et al. (1999)
5. Daeppen et al. (1999)		5. Tarquinio et al. (2001)	5. Grabbe, Nguy & Higgins (2012)
6. Doebrick & Todman (2003)		6. York, Brannon & Miller (2012)	6. Marcotte, Avants & Margolin (2003)
7. McCartney & O'Donnell (1981)		7. York Brannon & Miller (2012)	7. Pease, Brannon & Pilling (2006)
			8. Sadowski, Long & Jenkins (1993)
			9. Shadel & Cervone (2006)
			10. Shadel, Cervone, Niaura & Abrams (2004)
			11. Shadel et al. (2000)

Results

A total of 36 publications were identified. Of these, 17 duplicate publications were removed, and 10 additional relevant publications were included after an examination of reference lists provided in the assessed publications. After abstract reviews, 18 publications were excluded because they did not address the stated research questions; 11 focused on topics other than alcohol, and seven focused on the effects of the overall self-concept on alcohol use, not drinking-related self-schemas. Therefore, the review encompassed a total of 11 published works, focusing specifically on the structure or functioning of a drinking-related self-schema within AUD.

Of the 11 publications, seven were primary research studies. The study purpose, design, and sample characteristics for primary research studies are presented in Table 2. Key findings and methodologies used to operationalize drinking-related self-schemas are detailed in Table 3, and the publications are discussed and integrated below.

Table 2

Summary of methodological properties of data-based studies examining the structure, function and/or effects of a drinking-related self-schema

Study	Purpose	Design	Sample	Operationalization of drinking-related schemas
College students' alcohol-related problems: An autophotographic approach Casey & Dollinger (2007)	To replicate findings of previous research by the authors, that "alcohol identity" relates to alcohol use among college students; to assess whether age group/legality and gender moderate the relationship between alcohol identity and alcohol use; and to test whether alcohol identity predicts problematic alcohol use including driving intoxicated, binge drinking, drinking to induce intoxication, and drinking games	Cross-sectional	n=135 Undergraduate college psychology students Age= 22 years (SD=5.5, range=18-50) 45 men, 90 women	Autophotographic essay technique: Participants were instructed to compile 20 photographs answering the question "Who are you?" and provide a written commentary. It was required that at least 10 new photos be taken for the project Photos were coded for consumption of alcohol, display of alcohol and alcohol advertisements The number of alcohol-related photographs were used to determine the availability and degree of elaboration of a drinking-related schema
Self-cognitions in antisocial alcohol dependence and recovery Corte & Stein (2007)	To examine the valence, content, and organization of self-schemas in persons with antisocial alcohol dependence, persons in recovery and control participants; and to test a model in which these self-concept properties predict level of alcohol use	Cross-sectional between groups	n=65 total n=24 persons with a diagnosis of antisocial alcohol dependence n=18 persons in recovery from alcohol dependence n=23 community control participants 21-31 years of age 57% men	Zajonc card-sort task was employed to determine the number of valenced self-schemas and interrelatedness of self-schemas within the total self-concept A closed-ended Likert scale task patterned after Shadel, Mermelstein & Borrelli (1996), was employed to determine the availability of drinker and recovering alcoholic self-schemas

<p>How would you label your own drinking pattern overall? An evaluation of answers provided by 121 high functioning middle-aged men</p> <p>Daeppen et al. (1999)</p>	<p>To evaluate how high-functioning men in their 30's rate their alcohol consumption</p>	<p>Secondary analysis of alcohol genetics study data</p>	<p>n=181 total n=150 participants who did not meet DSM-III criteria for alcohol abuse or dependence n=15 participants who met criteria for alcohol abuse n=16 participants who met criteria for alcohol dependence</p> <p>Average age 38.7 years (SD=1.91)</p> <p>100% men</p>	<p>Participants were asked to rate their drinking pattern: "over the last 5 years, how would you label your own drinking pattern overall?"</p> <p>1-non-drinker, abstainer (non-drinker) 2- infrequent, occasional light social drinker (infrequent drinker) 3- moderate social drinker (moderate drinker) 4- frequent, heavy social drinker (heavy drinker) 5- problem drinker, alcoholic (problem drinker) 6- recovering alcoholic</p> <p>Drinking patterns were then compared to self-reported alcohol-related problems endorsed during alcohol SCID</p>
<p>Schematic processing of cigarette smoking and drinking information: Separate or shared?</p> <p>Doebrick & Todman (2003)</p>	<p>To test the hypothesis that the correlation between cigarette smoking and alcohol use may be partly attributable to a cross-substance facilitation/inhibition effect in which schematic processes derived from personal experience with one substance facilitates or inhibits the processing of information associated with the other</p>	<p>Cross-sectional between groups</p>	<p>n=123 total n=17 heavy drinkers-nonsmokers, n= 31 light drinkers-smokers, n=25 heavy drinkers-smokers, n=40 light drinkers nonsmokers</p> <p>Recruited from university students, local restaurants, retail establishments and healthcare facilities</p>	<p><i>Validation study:</i> Participants were presented with a list of 200 attributes from Anderson's (1968) list of personality trait words and asked to rate applicability of each attribute describing 3 types of activities, alcohol drinking, cigarette smoking and newspaper reading, using a 5pt Likert scale, as well as valence (+ or -) The 30 attributes with highest mean applicability for each of the three activities selected for use in study (15 positive and 15 negative)</p> <p>Each of the attribute words were added to one of three sentence stems (e.g. alcohol drinking is...) resulting in 3 separate lists of 30 descriptive statements</p>

			49 men, 74 women	<p><i>Study:</i> Participants were then presented with 3 envelopes, each containing one of the 3 activity-related statement lists and asked to indicate if they agreed or disagreed with each of the 30 sentences</p> <p>Participants were asked to write down as many attributes as they could remember from the statements to test memory encoding and facilitated information processing (indicators of schematic processing)</p>
Photographically portrayed identities, alcohol expectancies, and excessive drinking	To assess whether the alcohol-relevant identity presented in autophotographic essays related to self-reported drinking and whether such an identity contributes to the prediction of drinking when a well-established predictor of such behavior, alcohol expectancies, is accounted for	Cross-sectional	n=46 Undergraduate psychology college students Age 18-39 years 29 men, 52 women	Autophotographic essay technique, as described above
Dollinger et al. (1993)				
Development and validation of the alcohol identity implicit associations test (AI-IAT)	To develop the Alcohol-Identity Implicit Associations Test and examine the measures psychometric properties	Longitudinal with baseline, 3 month, and 6 month points	n=141 Undergraduate college students Age 18-22 years, mean 19.22 years 42 men, 97 women	<p>Autophotographic essay technique, as described above</p> <p>AI-IAT measure: Participants were shown a stimulus image on a computer screen and asked to assign it either to the joint category alcohol/me or the joint category water/not me. Stimulus images included alcohol-related pictures, drinking water related pictures, self-relevant words (e.g. self, me, mine, my), other relevant words (e.g. they, them, theirs, others). Response latency times for critical combination blocks were recorded using an IAT scoring algorithm</p>
Gray et al. (2011)				

<p>The perception of drinking roles by recovering problem drinkers</p> <p>McCartney & O'Donnell (1981)</p>	<p>To measure how problem drinkers evaluate semantically, the roles of "heavy controlled drinker," "light controlled drinker," "total abstainer," and "alcoholic," to measure the psychological distance between each of the aforementioned roles and the dependent drinker's conception of himself; to test the suggestion that the recovering problem drinker tends to delineate their self-concept as being significantly different from the way in which they picture "the alcoholic"</p>	<p>Cross-sectional n=29</p> <p>Inpatients admitted as "alcoholics" to short-stay wards of a public hospital</p> <p>Age 20-55 years, mean 35 years</p> <p>19 men, 10 women</p>	<p>The strength of the association between alcohol-relevant pictures and self-relevant words for each participant were calculated by means of standardized D score, and utilized to determine availability and elaboration of a drinking-related schema within participants</p> <p>Participants rated how they generally perceived their own disposition as well as how they perceived the disposition of drinking roles, including total abstainer, heavy controlled drinker, light controlled drinker, on a set of bipolar adjective pairs describing personality traits (from Osgood et al., 1957; Hoy, 1973; Hoy, 1977) on 7pt scale (e.g., honest-dishonest, escapist-realist)</p> <p>Ratings were used to determine the personality traits associated with drinking-related schemas</p>
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Review Questions 1 and 2: What is currently known regarding the availability, structure and effect of the drinking-related self-schema?

Seven primary research studies were found that supported availability of a drinking-related self-schema and established a relationship between the availability of a drinking-related self-schema and drinking behavior (Casey & Dollinger, 2007; Dollinger, Rhodes & Corcoran, 1993; Gray, LaPlante, Bannon, Ambady, & Shaffer, 2011; Daeppen, Smith, & Schuckit, 1999; McCartney & O'Donnell, 1981; Doebrick & Todman, 2003; and Corte & Stein., 2007). The search strategy did not render any publications finding absence of a drinking-related self-schema within moderate to heavy drinking samples, nor publications that failed to find a statistically significant relationship between availability of a drinking-related self-schema and drinking behavior.

Table 3

Results, interpretation of findings and relevance to research questions of data-based studies examining the structure, function and/or effects of a drinking-related self-schema

Study	Results	Interpretation of results and relevance to research questions
College students' alcohol-related problems: An autophotographic approach Casey & Dollinger (2007)	Results indicated that an "alcohol identity" uniquely contributed to the prediction of alcohol consumption, frequency and participation in risky alcohol-related behaviors with the highest identity scores predicting increasing problematic drinking and behavior scores	Findings suggest that an alcohol-related self-schema is available within light-to-moderate drinking college student samples, and that the elaboration of a drinking-related schema influences alcohol use and frequency and degree of alcohol-related problem behaviors. However the exact nature and content of the drinking-related self-schema within this sample is undetermined
Self-cognitions in antisocial alcohol dependence and recovery Corte & Stein (2007)	Persons with Antisocial Alcohol Disorder trended toward fewer positive self-schemas than did control participants, had more negative self-schemas, and trended toward higher interrelatedness than did those in recovery and control participants. They also showed evidence of a drinking-related self-schema, whereas those in recovery showed evidence of a recovery-related self-schema The three self-structure variables (number of schemas, valence, and interrelatedness) predicted negative affect, which predicted drinker self-schema score, which predicted the number of alcoholic drinks consumed	Findings suggest the simultaneous existence of multiple drinking-related self-schemas which vary in elaboration (i.e., both a drinking-related schema and a recovery related schema), and not a single drinking-related schema that is revised and refined over time as one transitions across the stages of change However the study focused on valence and elaboration of the overall self-concept and not the specific drinking-related schema, thus the nature and content of the drinking-related schema remains unexplored
How would you label your own drinking pattern overall? An evaluation of answers provided by 181 high functioning middle-aged men Daepfen et al. (1999)	Among persons with a DSM-III diagnosis of alcohol abuse, none rated their drinking pattern as "problem drinker." Among persons with a diagnosis of alcohol dependence 12.5% rated themselves as a "problem drinker," while the remainder of that group did not consider their drinking patterns as problematic. Despite being in inpatient treatment for alcohol dependence or abuse, and having experienced multiple negative	Findings suggest that persons with drinking experience do have some self-conceptualization within the domain of drinking and this self-conceptualization varies in nature, from non-drinker to problem drinker. Persons with a diagnosis of alcohol abuse and/or dependence, and self-identifying as moderate drinkers, averaged 4.2 negative drinking-related incidents, while

	<p>drinking-related incidents, no participants identified with the label of “alcoholic”</p> <p>Of non-AUD and AUD groups who rated themselves as moderate drinkers, those in non-group endorsed, on average, less than one alcohol-related problem while those in AUD group reported 4.2 problems</p> <p>Of non-AUD and AUD groups who rated themselves as heavy drinkers, those in non-AUD group reported fewer than 1 alcohol-related problem while those in AUD group reported 9.0 alcohol-related problems</p>	<p>persons self-identifying as heavy drinkers averaged 9.0 alcohol-related problems. These findings suggest that there is a strong, positive correlation between the nature of the drinking-related self-schema and drinking-related problems</p>
<p>Schematic processing of cigarette smoking and drinking information: Separate or shared?</p> <p>Doebrock & Todman (2003)</p>	<p>Results indicate that the correlation between cigarette smoking and alcohol use may be partly attributable to a cross substance facilitation/inhabitation effect in which schematic processes derived from personal experience with one substance facilitates or inhibits the processing of information associated with the other</p> <p>Smokers were significantly more likely than nonsmokers to have had problems associated with drinking ($p < 0.008$)</p> <p>Heavy drinkers endorsed significantly more positive drinking words than light drinkers $F(1,120) = 24.01$, $p = 0.0001$. Heavy drinkers endorsed significantly more positive drinking-related attributes than negative drinking-related attributes (HD/S=$p < 0.007$; HD/NS=$p < 0.0001$)</p> <p>The researchers concluded that two distinct schematic organizations exist for smoking and drinking with very minimal overlap in schematic content</p>	<p>Heavy and light drinkers could be distinguished from one another on the basis of schematic processing of alcohol-related information, suggesting that heavy and light drinking-related self-schemas are supported by different attributes, and guide differing drinking patterns</p>
<p>Photographically portrayed identities, alcohol expectancies, and excessive drinking</p> <p>Dollinger et al. (1993)</p>	<p>Results reveal a moderately strong correlation between number of alcohol-related pictures and drinking measures ($r = .45$) for frequency and ($r = .61$) for quantity</p> <p>Regression analysis revealed, 61% of variance in quantity was explained by alcohol expectancy, gender</p>	<p>Findings suggest that moderate experience within the domain of drinking, will result in availability of a drinking-related self-schema; and availability of a drinking-related self-schema is correlated with increased alcohol consumption</p>

	and alcohol identity. The largest weight in equation was for alcohol identity, $B=.494$, $t(42)=3.29$ $p<.01$, followed by gender $B=.38$, $t(42)=3.89$, $p<.001$	However the nature and content of the drinking-related self-schema was not determined, therefore it is unknown what drinking-related self-schema is related to increased consumption
Development and validation of the alcohol identity implicit associations test (AI-IAT) Gray et al. (2011)	Results revealed that AI-IAT scores were stable over time, internally consistent and positively correlated with autophotographic essay scores (a previously validated measure of alcohol identity) Baseline AI-IAT scores predicted future engagement in risky college drinking practices after controlling for standard alcohol consumption	Findings suggest a drinking-related self-schema enhances information processing among persons with stronger self/alcohol associations, therefore providing evidence of enhanced schematic processing with greater elaboration of the drinking-related self-schema In addition, findings suggest that the more elaborate the drinking-related schema is, the more likely one is to regularly participate in drinking-related behavior
The perception of drinking roles by recovering problem drinkers McCartney & O'Donnell (1981)	Results -revealed the roles of heavy controlled drinker, light controlled drinker and total abstainer were positively evaluated by "problem drinking" participants. The role of alcoholic was negatively evaluated by participants The greatest psychological distances were between a problem drinkers conception of himself and "alcoholic" and himself and "total abstainer" The distance between "myself" and "heavy controlled drinker" was significantly smaller than between self and all other roles	Findings suggest that persons with AUD do have an elaborate conceptualization of themselves within the domain of drinking which consists of valenced supporting attributes

Availability. Of the seven publications identified, three found that a drinking-related self-schema was available within their samples of moderate-to-heavy drinking college students, and determined that the degree of elaboration of the drinking-related self-schema was a key structural property influencing drinking behavior. The study by Dollinger et al. (1993) was designed to test the validity of an autophotographic essay technique as a means of establishing the availability of an alcohol schema within a college sample of social drinkers. Researchers asked participants to compile 20 photographs answering the question, “Who are you?” in order to determine the relationship between the availability of an alcohol-related self-schema and drinking behaviors. Availability of a drinking-related self-schema was operationalized as having one or more drinking-related pictures within their autophotographic essay, while a greater number of drinking-related photographs within the essay suggested greater elaboration of the schema. The authors found that an alcohol schema was available within their sample of college students who reported drinking an average of 5.2 drinks per occasion, twice per month, on a self-report measure. Moderate-to-strong correlations were found between the number of reported pictures and amount of alcohol consumed ($r=.45$, $p<.01$ for frequency and $.61$, $p<.001$ for quantity). Similarly, within a separate study, Casey and Dollinger (2007) used the technique within a sample of 135 college students who reported drinking on average six drinks per occasion, three times per month, in order to confirm the results of the previous study, and to evaluate the relationship between the availability of an alcohol schema and alcohol-related problem behaviors. Results revealed that 71% of the sample included at least one alcohol photograph ($M=2.12$, $SD=2.36$), with participants with one to three alcohol photos being 2.4 times more likely to be high-risk problem drinkers than those with no such photos. Those with four or more alcohol photos in their essays were nearly eight times more likely to be high-risk

problem drinkers. High-risk drinking included participating in activities such as driving while intoxicated, binge drinking, drinking to induce intoxication, and participating in drinking games.

Similar to the Dollinger publications, the study by Gray et al. (2011) was designed to examine the validity of a newly created measure, the Alcohol Identity Implicit Associations Test (AI-IAT), as a means of establishing the availability of an alcohol-related self-schema and determining the effect of the schema on information processing and drinking behavior.

Availability of a drinking-related self-schema was operationalized using response latency times for personal (Me/Not Me) endorsements of drinking-related and neutral stimulus pictures.

Researchers attributed shorter response latency times to greater elaboration of the drinking-related self-schema. The authors found that an alcohol schema was available within their sample of 141 college students, who reported consuming an average of 3.58 drinks per occasion 5 times during the preceding month, and the presence of the schema predicted future engagement in risky college drinking practices after controlling for quantity and frequency of alcohol consumption. Moreover, consistent with a schema model, this study found that having an alcohol schema resulted in faster information processing speeds according to response latency times among persons with stronger self/alcohol associations (Gray et al., 2011).

Thus, there was agreement across the three studies that a drinking-related self-schema is available within drinking samples, and that it varies in elaboration, with a greater degree of elaboration being associated with increased drinking-related behavior. However, beyond establishing availability and elaboration, these three studies did not identify the content of the drinking-related self-schema. That is, they did not ascertain the generalized notion that one has of themselves within the domain of drinking (the highest level of the self-schema hierarchy) or if the schema is comprised of predominantly positively or negatively valenced content, the

mid-level of the self-schema hierarchy.

Structure. While the preceding three studies support availability of a drinking-related self-schema, they provide little guidance regarding the structural properties of the schema. The study conducted by McCartney and O'Donnell (1981) was the first of the remaining four studies that associated attributes with drinking-related self-conceptualizations. However, the researchers did not examine the attributes supporting one's own drinking-related self-schema. Researchers had 29 men and women, admitted to inpatient treatment for an AUD, rate how they perceived their own personality traits and personal attributes on a set of bipolar adjective pairs, as well as how they perceived the disposition of drinking roles- including total abstainer, heavy controlled drinker, light controlled drinker, and alcoholic- by ascribing specific traits and attributes to a variety of drinking roles, and then used a formula to calculate psychological distance. Results indicated that the greatest psychological distance existed between the traits ascribed to one's self and those attributed to the conceptualization of alcoholic, and the closest distance was between one's self and heavy controlled drinker (McCartney & O'Donnell, 1981). The authors concluded that men and women with a diagnosable AUD were most likely to see one's self as a heavy controlled drinker, and were least likely to see one's self as alcoholic. Moreover, consistent with a self-schema model, this study suggests that persons experiencing AUD do have declarative knowledge of one's self within the domain of drinking which is supported by traits and attributes.

Results of the study conducted by Daepfen et al. (1999) were congruent with the findings from McCartney and O'Donnell (1981). The researchers conducted the study to determine how high functioning men in ages 30 years to 40 years who met DSM-III criteria for alcohol abuse or dependence rated their alcohol consumption. Researchers had 150 men who did not meet

DSM-III criteria for an AUD, 15 men who met criteria for alcohol abuse, and 16 men who met criteria for alcohol dependence rate their drinking patterns over the five years preceding the study. It was determined that 40% of the men who met DSM-III criteria for alcohol abuse rated themselves as infrequent drinkers, and 60% rated themselves as moderate drinkers, while 43.5% of the men who met DSM-III criteria for alcohol dependence rated themselves as moderate drinkers, and 37.5% rated themselves as heavy drinkers. Furthermore, none of the men in the alcohol abuse group self-identified as a problem-drinker or alcoholic, and only 12.5% of those in the dependence group self-rated as a problem-drinker, while none considered themselves to be alcoholic (Daepfen et al., 1999). Results suggest that men with a high level of alcohol drinking experience demonstrate variability in the way they self-conceptualize and identify as drinkers, and that the generalized notion of self within the domain of drinking varies according to some underlying cognitive mechanism. However, this study lacked generalizability due to a homogeneous sample of males in their thirties.

A more recent study by Doebrick and Todman (2003) adds further insight regarding the structural properties of the drinking-related self-schema by being the first of the retrieved publications to include the concept of valence in their study. Researchers tested the hypothesis that the correlation between cigarette smoking and alcohol use may be partly attributable to a cross-substance facilitation or inhibition effect in which schematic processes derived from personal experience with one substance facilitates or inhibits the processing of information associated with the other. In order to test this hypothesis, the researchers divided 123 participants into four groups: heavy drinking non-smokers (n=17); light drinking smokers (n=31); heavy drinking smokers (n=25); and light drinking non-smokers (n=40). They were then presented with a list of 200 attributes and asked to rate applicability of each attribute to describe

three types of activities: alcohol-drinking, cigarette-smoking, and newspaper reading, along with completing additional measures of drinking behavior and self-cognition (Doebrick & Todman, 2003). Researchers found that participants had two distinct schematic organizations for smoking and drinking, with very minimal overlap in attributes between the two networks. Moreover, results revealed that heavy drinkers endorsed significantly more positive drinking words than light drinkers ($F(1,120)=24.01, p=0.001$), and significantly more positive drinking-related attributes than negative drinking-related attributes (heavy drinking smokers= $p<0.007$; heavy drinking non-smokers= $p<0.001$). In addition, the heavy drinker group recalled significantly more positive drinking attributes than light drinkers ($F(91,117)=12.40, p=0.0006$), while no difference in the number and valence of drinking attributes recalled was demonstrated by light drinkers. These results support the availability of a drinking-related schema that influences information processing, and suggest that the schema is composed of related attributes that vary in content and valence predictably by drinking pattern (heavy vs. light drinking).

Finally, a study by Corte and Stein (2007) was the only one in the review in which investigators determined availability, content at the highest level of the self-schema hierarchy, and valence of self-schemas within a problem drinking sample. Researchers compared the structural properties of the overall self-concept among a sample of 24 young adults with antisocial alcohol dependence (AAD), 18 young adults in recovery from antisocial alcohol dependence, and 23 community control participants. Higher drinker schema scores were found within the AAD group compared with those in recovery ($t=5.41, p<.001$), and control participants ($t=6.69, p<.001$), and the recovery group had higher recovering alcohol schema scores compared with those in the AAD group, ($t=5.72, p<.001$) and control participants, ($t=13.87, p<.001$). The AAD group had higher recovering alcoholic schema scores compared

with control participants, ($t=7.14, p<.001$). Moreover, this study found self-structure variables, including valence and interrelatedness, predicted level of alcohol use and number of alcoholic drinks consumed in the month preceding the study. These results also suggested that a specific drinking-related self-schema is available, and it varies in content between active drinkers and those in recovery, with a specific drinking-related schema supporting content-congruent drinking and recovery behavior. Results suggested that a drinking and a recovery-related schema may exist simultaneously, but vary in impact on behavior.

Models of Addiction. In addition to the preceding seven data-based publications, four publications were retrieved that were theoretical models developed to explain how self-schemas may be related to drinking and recovery-related behaviors (Avants & Margolin, 2004; Brown, 1996; Denzin, 1993; Galanter, 2014). Table 4 summarizes the available literature proposing theoretical models pertaining to self-schemas and AUD.

Table 4

Self-schema based models of alcohol use and addiction

Model	Model purpose	Key postulate(s)
Development of spiritual self-schema (3-s) therapy for the treatment of addictive and HIV risk behavior Avants & Margolin (2004)	Proposes a self-schema based addiction treatment program	Based on the premise that habitual activation of an “addict” self-schema leads to high-risk behavior. Goal of the proposed therapy is to elaborate a self-schema for abstainer and harm- prevention (the spiritual self-schema) The therapy employs cognitive-behavioral techniques to facilitate shift in self-schemas from addict schema to spiritual schema
Treating the alcoholic: A developmental model of recovery Brown (1996)	Proposes a self-schema based alcohol treatment program	Based on the premise that alcohol assumes a central organizing role in the alcohol-dependent person’s daily routines, including interactions with friends, family at work and leisure routines
The alcoholic society: Addiction and recovery of the self Denzin (1993)	Proposes a self-schema based model to understand cognitive factors underlying problem drinking	Based on the premise that an alcohol-related self becomes a “master identity that overrides all other [self] conceptions the alcoholic has” It is proposed that an alcohol identity is taken on to cope with the lack of a clear and focused self Thoughts about the self in relation to alcohol, become the primary source of self-definition and serve to drive alcohol-related behaviors while other self-conceptions simultaneously recede in importance
Alcoholics anonymous and twelve step recovery: A model based on social and cognitive neuroscience Galanter (2014)	Proposes a neurocognitive model to understand factors underlying recovery in Alcoholics Anonymous	It is proposed that the activities encouraged in AA (mirroring and mutuality and storytelling), encourage inward reflection and integration of memories into the self-concept, which are relied upon later for self-regulation and future oriented understanding and behavior

Of the four publications detailing models, Galanter (2014) proposed a model to explain how the program of Alcoholics Anonymous encourages integration of drinking-related information into the overall self-concept from a neuro-psychological perspective. This model supports the concept that drinking-related information is encoded in self-referential neurological networks. However, the model did not address where or how within the self-concept drinking-related information is being encoded. For example, is it encoded within a drinking-related self-schema, or elsewhere within the self-concept? The final three published models (Avants & Margolin, 2004; Brown, 1996; and Denzin, 1993) proposed that an addict self-schema becomes an over-riding identity that drives problematic drinking behavior. Thus, when taken as a whole, there is relative consistency across existing schema-based models of alcohol use that a drinking-related self-schema is available and undergirds behavior within the domain of drinking. However, existing models do not address the structural properties or content of the drinking-related self-schema, limiting insight into the cognitive processes occurring within AUD.

In summary, when the schema-based models of alcohol use are synthesized with the preceding body of data-based alcohol-schema publications, four insights regarding the structure and effect of drinking-related self-schemas become evident. First, the literature supports the notion that persons with at least moderate drinking experience do display availability of a drinking-related self-schema. Second, the drinking-related self-schema is associated with personal traits and supporting attributes that are easily accessible and reportable by the drinker. Third, the drinking-related self-schema varies in its content across the drinking spectrum from

non-problematic drinkers to persons with diagnosable AUD, including individuals in recovery. Fourth, the drinking-related self-schema varies in elaboration, with greater elaboration resulting in greater influence on schema-consistent behavior (e.g., drinking or recovery-related behaviors).

Review Question 3. How are drinking-related self-schemas operationalized within the health and psychosocial literature?

Results revealed that there was little consistency across publications regarding methodologies used to operationalize the availability of drinking-related self-schemas. See Table 2 for an overview of methodologies used by researchers. In two studies, investigators used an autophotographic essay technique, two studies had participants rate traits on descriptiveness, one study employed a closed-ended Likert measure, one study utilized a recall task, and one study utilized a response latency task in combination with the autophotographic essay technique. All methodologies with the exception of the autophotographic essay technique have been utilized within the greater body of self-schema literature, lending support to validity. However, the diversity of methods used within the alcohol literature makes comparison of results across studies problematic.

Grading and strength of individual data-based publications. Retrieved research studies were graded for rigor and quality using Polit and Beck's (2003) system for grading the strength of evidence. Consistent with this system, a publication was assigned a rating of *good* if it met all six of the associated criteria for a rating of good; assigned a rating of *fair* if it met all six criteria for a rating of fair, but did not meet all criteria for good; or *poor* if it did not meet established criteria. It was determined that four studies met the highest possible grade of good, according to the grading rubric, while three studies met the mid-grade of fair. Table 5 displays the assigned grades for each data-based publication using both Polit and Beck's (2003) criteria

and Grimes and Schulz's (2002) criteria. Casey and Dollinger (2007) and Dollinger et al. (1993) were assigned the grade of fair because the methodology used to operationalize availability of a self-schema is not traditionally used within the self-schema literature, raising validity concerns. The study by McCartney and O'Donnell (1981) was assigned a fair grade due to an unusually small sample size for schema literature (n=29), and having a sample composed of all men, limiting generalizability.

Table 5

Grading results for retrieved data-based publications, utilizing criteria for the evaluation of the quality of evidence provided by

Grimes & Schulz (2002) and Polit & Beck (2003)

Publication and Author	Methods consistent with existing schema literature	Systematic approach to data collection, analysis, description of findings	Adequate Sampling	Control or comparison group	Multiple levels of abstraction for data analysis	Risk of bias identified	No major methodological concerns	Grimes & Schulz (2002) Quality Grade	Polit & Beck (2003) Quality Grade
College students' alcohol-related problems: An autophotographic approach Casey & Dollinger (2007)	No	Yes	Yes	No	Yes	Yes	Yes	II-3	Fair
Self-cognitions in antisocial alcohol dependence and recovery Corte & Stein (2007)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	II-2	Good
How would you label your own drinking pattern overall? An evaluation of answers provided by 121 high functioning middle-aged men Daepfen et al. (1999)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	II-2	Good
Schematic processing of cigarette smoking and drinking information: Separate	Yes	Yes	Yes	Yes	Yes	Yes	Yes	II-2	Good

or shared? Doebrick & Todman (2003)									
Photographically portrayed identities, alcohol expectancies, and excessive drinking Dollinger et al. (1993)	No	Yes	Yes	No	Yes	Yes	Yes	II-3	Fair
Development and validation of the alcohol identity implicit associations test (AI-IAT) Gray et al. (2011)	Yes	Yes	Yes	No	Yes	Yes	Yes	II-3	Good
The perception of drinking roles by recovering problem drinkers McCartney & O'Donnell (1981)	No	Yes	No	No	Yes	No	Yes	II-3	Fair
Overall Strength of Body of Literature (Grimes & Schulz, 2002)	B								

Grading and strength of individual published models. Retrieved self-schema models were graded using criteria for the analysis and evaluation of theory outlined by Fitzpatrick and Whall (2005). Criteria and results are displayed in Table 6. It was determined that two models met the highest possible grade of 7, while one model was assigned the grade of 5, and one model was assigned a grade of 4. The model published by Denzin (1993) received a grade of 5 due to incongruences in the model and because it has not been tried and empirically supported. The model published by Galanter (2014) received a grade of 4 because the linkages within the model were unclear, there appeared to be gaps in the model, and it has not yet been utilized and supported within practice or research.

Table 6

Grading results for retrieved models, utilizing criteria for the analysis and evaluation of theory provided by Fitzpatrick & Whall (2004)

Model and Author	Are the major concepts clearly defined?	Are the concepts operationalized in a way that is congruent with empirical data?	Are gaps or inconsistencies in the theory circumvented?	Are the concepts clearly related via statements?	Is there congruency of all components of the theory?	Are the tenants of the theory supported by existing research?	Has the theory been supported in practice or research?	Grade
Development of spiritual self-schema (3-S) therapy for the treatment of addictive and HIV risk behavior Avants & Margolin (2004)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7
Treating the alcoholic: A developmental model of recovery Brown (1996)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7
The alcoholic society: Addiction and recovery of the self Denzin (1993)	Yes	Yes	Yes	Yes	No	Yes	No	5
Alcoholics anonymous and twelve step recovery: A model based on social and cognitive	Yes	Yes	No	No	Yes	Yes	No	4

Assessing the strength of the overall body of literature. Results of this integrative review of the literature reveal that understanding of the structural properties of the drinking-related self-schema is still early with seven fair-to-good quality research studies addressing the topic. Utilizing Grimes and Schulz's (2002) criteria for grading the overall strength of the literature, the body of reviewed alcohol-focused schema literature received an overall grade of B, indicating that the body of evidence available is fair (see Table 5). The current body of research did not receive the highest score of A because it currently consists of a few isolated publications conducted over the past twenty years, rather than a cohesive line of research. The disparate nature of the body of research has resulted in inconsistent use of terminologies and theoretical and operational definitions for important variables, making comparisons across the literature problematic. For example, the term, "self-schema," could be used to refer to a generalized notion of one's self within a specific domain as employed by Casey and Dollinger (2007), Dollinger et al. (1993), and Gray et al. (2011), and Corte and Stein (2007), or to a group of attributes or self-descriptors within a single domain as was detailed by Daeppen et al. (1999), Doebrick and Todman (2003), and McCartney and O'Donnell (1981). Traditionally, within the broader body of self-schema literature, the term self-schema is used to refer to a single domain-specific organization of knowledge comprised of traits or attributes drawn out of personal experiences within the domain (Markus, 1977; Stein, 1995).

Discussion

The Self-Schema Model of the Self-Concept dictates that the content and elaboration of domain-specific self-schemas are the key structural properties that drive self-perception and behavior. As such, understanding these fundamental components of drinking-related

self-schemas is a foundational step toward developing theoretically grounded and empirically supported interventions addressing AUD. Despite the availability of a growing body of literature suggesting that drinking-related self-schemas are available and do influence behavior, more research is needed to understand the overall structure of the drinking-related self-schema before interventions addressing AUD can be developed.

Since the schema model dictates that the content of a domain-specific self-schema drives domain-congruent behavior, failure within the literature to determine the content of the drinking-related self-schema, is a notable limitation within the existing body of schema/AUD research. The Self-Schema Model of the Self-Concept would predict that if one has an elaborate social drinker or light drinker type schema, which would be supported by more benign attributes in comparison to a problem drinking type self-schema, then his or her drinking behavior is likely to vary greatly in comparison to one who has an elaborate problem-drinker, or an elaborate recovery, schema. However, all of the existing publications fell short of exploring such structural properties.

Conclusions / Implications for Future Research

An extensive review of the literature suggested that the unique content and structure of drinking-related self-schemas undergirded self-conceptualization within the domain of drinking, as well as drinking and recovery-related behaviors. Variation within the structural properties of these schemas may serve as the key cognitive feature that determines how one views his or her drinking and a need for treatment, as well as guiding drinking and recovery-related behaviors. If variation in the structural properties of the drinking-related self-schema can be established empirically, then interventions focused on modifying the structural properties can be pursued, paving the way for new and more effective avenues for treatment for alcohol use disorder.

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CHAPTER THREE

PROBLEM RECOGNITION IN ALCOHOL USE DISORDER: PROPOSAL OF A SELF-SCHEMA MODEL

Introduction

Despite the enactment of robust public health campaigns targeting problematic drinking and drinking behaviors, and the availability of numerous treatment options for alcohol use disorder (AUD), AUD persists as a significant public health challenge. A recent national survey on drug use and health conducted by the Substance Abuse and Mental Health Services Administration found that 6.7% of the United States population, or 16.9 million individuals aged 12 or older, reported current heavy drinking (as defined as consuming 5 or more drinks on the same occasion on each of 5 or more days in the past 30 days) (Substance Abuse and Mental Health Services Administration, 2011). Moreover, the survey compared participants survey responses to DSM-IV criteria for alcohol abuse and dependence and found that 18.5 million individuals aged 12 or older within the United States met criteria for alcohol dependence or abuse, representing 7.3% of the U.S. population.

The personal, social, and economic ramifications of problematic alcohol use are substantial (World Health Organization, 2004; Centers for Disease Control and Prevention, 2014; Room, Babor & Rehm, 2005). According to the Centers for Disease Control and Prevention, excessive alcohol use contributes to approximately 88,000 deaths per year in the United States and an economic cost of \$223.5 billion dollars per year (Centers for Disease

Control and Prevention, 2014). Moreover, alcohol has been causally related to more than 60 different medical conditions and accounted for as much death and disability globally as both tobacco and hypertension (Room et al., 2005). Alcohol use has been linked to disease in nearly every body system including heart disease and strokes, digestive diseases, liver disease, reproductive problems and birth defects, polyneuropathy, psychoses and depression, in addition to cancers of the mouth, throat, esophagus, liver, stomach, colon, breast, prostate, rectum, and ovaries (World Health Organization, 2004; Centers for Disease Control and Prevention, 2014). The societal consequences of excessive alcohol use are also significant. Alcohol use has been linked to work accidents, absenteeism, decreased work productivity, unemployment, poverty, domestic violence, injury, and divorce (World Health Organization, 2004). Furthermore, the National Council on Alcoholism and Drug Dependence (1998) reported 5.3 million adults, or 36% of those charged with crimes, were drinking at the time of committing their offence, with alcohol being a key factor in 37% of rapes and sexual assaults, 15% of robberies, 27% of aggravated assaults, and 25% of simple assaults (National Council on Alcoholism and Drug Dependence, 1998).

Despite the significant health and social consequences of excessive alcohol use, problem recognition and treatment-seeking rates remain poor. The Substance Abuse and Mental Health Services Administration (2011) survey found that of those who met diagnostic criteria for an AUD, 1.6 million people received treatment for their alcohol use at some time in the past, representing only 8.5% of the people who needed treatment for an AUD according to DSM-IV criteria. It was determined that there were 17.0 million people who needed but did not receive treatment for an alcohol use disorder in 2011. Finally, perhaps the most striking finding of this survey was that only 5% of individuals with a DSM-IV diagnosable AUD felt that they did have

an alcohol use problem, with even fewer individuals taking steps toward seeking treatment. These findings reveal that AUD continues to be a prevalent and persistent health issue within the United States, with impaired problem recognition continuing to be a salient barrier that must be overcome in order for people to seek and receive needed treatment.

Impaired problem recognition. Both the empirical and theoretical addictions literature consistently identify impaired problem recognition as a barrier that must be overcome in order for one to perceive the need for treatment (Duffy, 1995; Miller, 2001; Stewart & Connors, 2007; Wing, 1995), seek assistance for an AUD (Duffy, 1995; Howard et al., 2002; Rinn, Desai, Rosenblatt, & Gastfriend, 2002; Tarter, Alterman, & Edwards, 1984; Verdejo-Garcia & Perez-Garcia, 2008; Wing, 1996; Wing & Hammer-Higgins, 1993), and for AUD treatment and recovery to be successful (Allan, 1991; Duffy, 1995; Edlund, Booth, & Feldman, 2009; Goldsmith & Green, 1988; Hedden & Gfroerer, 2011; Roth & Fonagy, 2006). However, the phenomenon of impaired problem recognition continues to be poorly understood.

In the social-cognitive addictions literature, the definition of impaired problem recognition is an inability to recognize that addiction-related behaviors are causing financial, social or emotional dysfunction in one's life, and a lack of intention to change addiction-related behavior in the foreseeable future (Denzin, 1993; Dorpat, 1983; Duffy, 1995; Goldstein et al., 2009; Manousoff & Williams, 1998; Prochaska & DiClemente, 1982; Rinn et al., 2002; Tarter et al., 1984; Wing & Hammer-Higgins, 1993). Within this literature, impaired problem recognition is attributed to disturbances within cognitive processing (Denzin, 1993; Dorpat, 1983; Forchuck, 1986; Hull, 1981; Hull & Reilly, 1983; McMahon & Jones, 1992; Nye, Agostinelli, & Smith, 1999; Pennock & Poudrier, 1978; Prochaska & DiClemente, 1982; Tarter et al., 1984; Wing, 1995; Wing & Hammer-Higgins, 1993), or more specifically to disturbances in processing

self-referential information (Banaji & Steele, 1989; Hull, 1981; Hull & Schnurr, 1986; Sachs, 2003). However, little is known regarding the neurocognitive structures and functioning that result in disturbances in the processing of self-referential information.

Current models of impaired problem recognition within AUD remain highly abstract and general in nature (see Denzin, 1993; Dorpat, 1983; Hull & Schnurr, 1986; Tarter et al., 1984; Wing & Hammer-Higgins, 1993), providing little direction for examining the link between the self-concept and impaired problem recognition on a neurocognitive level. Moreover, much of the social-cognitive literature exploring impaired problem recognition is dated, with little theoretical development within the field since the early 1990's (See Table 7 for a summary of available neurocognitive models of the self-concept within AUD). However, the Self-Schema Model of the Self-Concept has the potential to offer a contemporary, more concise understanding of the cognitive processes that result in impaired problem recognition on a neurocognitive level. The Self-Schema Model of the Self-Concept is a middle-range theory developed to explain cognitive mechanisms that form the self-concept (Markus & Wurf, 1987; Markus, 1977). It addresses the structural and functional properties of the self-concept and provides a means for studying how the structural properties influence perceptions and behavior (McConnell & Strain, 2007; Oyserman & James, 2009; Stein & Corte, 2008).

Table 7

Neurocognitive models of the self-concept in alcohol use disorder

Model	Author/Date	Model Focus/Purpose	Key Postulates
Treating the alcoholic: A developmental model of recovery	Brown (1996)	Proposes a self-schema based alcohol treatment program	Based on the premise that alcohol assumes a central organizing role in the alcohol-dependent person's daily routines including interactions with friends, family, at work, and leisure routines
Schema model of the self-concept to examine the role of the self- concept in alcohol dependence and recovery	Corte (2007)	Proposes a framework for interpreting and understanding the role of the self-concept in alcohol dependence and recovery	Posits that specific disturbances in the underlying structure of the self-concept are considered intermediary factors that serve as important mechanisms that link more distal factors (genetic factors and family history of alcohol problems) to alcohol use The model proposes that the structural properties of the self-concept motivate maladaptive alcohol use behavior
The alcoholic society: Addiction and recovery of the self	Denzin (1993)	Proposes a self-schema- based model to understand cognitive factors underlying problem drinking	Based on the premise that an alcohol-related self becomes a "master identity that overrides all other [self] conceptions the alcoholic has" It is proposed that an alcohol identity is taken on to cope with the lack of a clear and focused self Thoughts about the self in relation to alcohol, become the primary source of self-definition and serve to drive alcohol-related behaviors while other self-conceptions simultaneously recede in importance
The cognitive arrest	Dorpat (1983) and	Proposes a neurocognitive	It is proposed that denial is a defense mechanism,

hypothesis of denial	Dorpat (1987)	model of the processes that result in denial	subconsciously enacted to protect the self-concept from disturbing information Denial results from the processes of preconscious appraisal of danger, painful affect and defensive actions, cognitive arrest and screen behavior
The neurology of alcoholic denial	Duffy (1995)	Proposes a neurocognitive model to understand denial in AUDs	It is proposed that individuals experiencing AUD are characterized by developmental traits, including unstable arousal regulation, inability to cognitively discriminate interoceptive cues and physiological states, and a tendency to cognitively underestimate emotional significant situations, resulting from the neurotoxic effects of alcohol use
The cognitive dissonance framework for understanding denial in AUD	Forchuck (1986)	Proposes a cognitive dissonance model of denial in AUD	It is proposed that cognitive dissonance results from being faced with the notion that one might be an alcoholic. In order to resolve the dissonance he or she can a) deny alcoholism, b) accept a more negative overall self-concept, or c) reject the alcoholic stereotype
Alcoholics Anonymous and twelve step recovery: A model based on social and cognitive neuroscience	Galanter (2014)	Proposes a neurocognitive model to understand factors underlying recovery in Alcoholics Anonymous	It is proposed that the activities encouraged in AA (mirroring and mutuality and storytelling), encourage inward reflection and integration of memories into the self-concept, which are relied upon later for self-regulation and future oriented understanding and behavior
The neurocircuitry of impaired insight in drug addiction	Goldstein et al., (2009)	Proposes a neurocognitive model to explain impaired insight in drug addiction	It is posited that denial reflects dysfunction of brain networks sub-serving interoception, self-awareness, insight, and appropriate social, emotional and cognitive responses

Self- awareness model of alcohol use	Hull (1981) and Hull, Levenson, Young, & Sher (1983)	Proposes a cognitive model to explain why individuals experiencing AUD are motivated to drink alcohol	<p>It is proposed that individuals experiencing AUD consume alcohol to diminish self-awareness and thus reduce self-criticism and negative affect</p> <p>It is posited that alcohol serves to decrease an individual's level of self-awareness by interfering with encoding processes fundamental to a state of self-awareness</p>
The locus of denial	Manousos & Williams (1998)	Proposes a cognitive model to assist clinicians in identifying possible stages within cognitive processing that denial can occur	It is posited that denial is a multidimensional phenomenon that can occur during various stages of cognitive processing, including at the person-world interface, at the stage of perception and recognition, at the stage of contextualization of information, at the stage of memory and meaning-making, or at the stage of action
Revised expectancy motivation model based on Bandura	McMahon & Jone's (1992)	Proposes an expectancy/motivation model of relapse prevention to aid clinicians in reducing relapse in AUD	It is posited that salient information needed for change stems from the individual's own experience and values and that when an individual fails to appraise this information appropriately the clinician must help by encouraging reflection and reinterpretation of past experiences in order to lead to a more valid appraisal by the client
Enhancing alcohol problem recognition: A self-regulation model for the effects of self-focusing and normative information	Nye et al. (1999)	Proposes a self-regulation model for predicting problem recognition within heavy alcohol drinkers	<p>Proposes heavy drinkers experience difficulty with two cognitive processes: 1) self-monitoring sub-processes, including the ability to intentionally focus on one's behavior, and 2) self-evaluation sub-processes, comparing personal experiences to some internal or external goal or standard</p> <p>Impaired problem recognition posited to result from</p>

			impairment of these processes
Overcoming denial: Changing the self- concept in AUD	Pennock & Poudrier (1978)	Proposes a cognitive dissonance model of denial in AUD	Posits denial is a defense mechanism rooted in subconscious maneuvers to protect one from dissonance encountered when he or she is confronted with accepting the alcoholic self-concept
Biopsychological interpretation of denial in AUD	Tarter et al. (1984)	Proposes a biopsychological model of denial	It is posited that denial is a consequence of a developmental defect in the ability to perceive and evaluate interoceptive stimuli and in the appraisal of the significance of environmental events
Transcending alcoholic denial	Wing (1995) and Wing & Hammer- Higgins (1993)	Proposes model of the stages that individuals must move through in order to overcome denial in AUD	It is posited that denial results from an inability to ascribe accurate meaning to and alter one's self-perception in reaction to critical drinking-related events Stages to overcoming denial include 1) reacting to the critical event, 2) role disaffiliation, 3) ambiguous anticipation, 4) peer affiliation, and 5) acceptance

The Self-Schema Model of the Self-Concept has become a leading social-cognitive framework for understanding how people process social and health-related information (Markus, Hamill, & Sentis, 1987; Oyserman, Fryberg, & Yoder, 2007; Shadel & Mermelstein, 1996; Shadel, Niaura, & Abrams, 2000; Stein & Corte, 2007; Stein & Markus, 1994), and has received increased attention for therapeutic intervention (Avants & Margolin, 2004; Avants, Margolin, & McKee, 2000; Kearney & O'Sullivan, 2003; Kendzierski & Costello, 2004; Margolin, Beitel, Schuman-Olivier, & Avants, 2006; Oyserman, Bybee, & Terry, 2006; Shadel, Mermelstein, & Borrelli, 1996; Shadel et al., 2000). Employing the Self-Schema Model of the Self-Concept to understand the cognitive mechanisms undergirding the phenomenon of impaired problem recognition is a critical first step in developing effective, theoretically and empirically grounded interventions for improving treatment-seeking and outcomes in AUD, by identifying structural properties of the self-concept that can be targeted for therapeutic intervention.

The purpose of this report is to propose the Self-Schema Model of Impaired Problem Recognition (SSM-IPR) grounded within the Self-Schema Model of the Self-Concept. The report will begin with a review of the Self-Schema Model of the Self-Concept, followed by the proposal of a self-schema model of impaired problem recognition within AUD, grounded within both the self-schema and addictions literatures. Finally, implications of the proposed model for future research and clinical practice will be discussed.

The Self-Schema Model of the Self-Concept

The Self-Schema Model of the Self-Concept posits that the self-concept is composed of multiple, domain-specific, self-referential memory structures called self-schemas. Self-schemas are highly elaborated knowledge structures about the self that are stored in long-term memory.

They have been shown to be critical in all aspects of processing self-relevant information, including directing attentional focus, influencing what information is encoded within the self-concept, recollection, self-perception and meaning-making (Klein, 2001; Klein & Loftus, 1993; Leonard, Dunn, & Jacob, 1983; Markus, 1977; Oyserman & Destin, 2010; Schwartz et al., 2010; Schwartz & Waterman, 2006). They reflect long term, stable yet malleable neural pathways established over time, as a result of repeated behavioral and social experience within a specific domain (Dweck, Chiu, & Hong, 1995; Henderson, Hagger, & Orbell, 2007; Klein, 2001; Leary, 2007; Leary & Tangney, 2003; Lieberman, Jarcho, & Satpute, 2004; Oyserman et al., 2007).

Self-schema structure. The Self-Schema Model of the Self-Concept proposes that self-schemas are formed over time as behavioral experiences accumulate within a domain of social experience and similarities across episodes are extracted (Friedman & Haaga, 2007; Klein & Kihlstrom, 1986; Klein & Loftus, 1993; Klein, Sherman, & Loftus, 1996; Markus, 1977). Self-schemas are hierarchically organized knowledge structures with generalizations or abstractions about one's self with domains of experience at the highest level, categories of more specific information supporting the generalizations in the mid-level, and specific examples obtained from experience within the domain located at the lowest level of the hierarchy (Klein & Kihlstrom, 1986; Markus & Kunda, 1986; Markus & Wurf, 1987).

McConnell (2011) more specifically found that the mid-level of the hierarchy is comprised of attributes that can include traits (e.g., shy), behaviors (e.g., philanthropy), affective responses (e.g., happy), and physical characteristics (e.g. attractive), as well as other information that is descriptive of one's self within a particular context (McConnell, 2011; Schleicher & McConnell, 2005). These attributes vary across individuals and have been shown to be derived

from many sources, including one's culture, feedback provided by others, inferences drawn from one's own behavior, experiences from one's environment, and experienced bodily states (McConnell, Rydell, & Brown, 2009; Neisser, 1991; Shweder et al., 1998). For an in-depth discussion of the structural properties of the self-concept see Chapter Two.

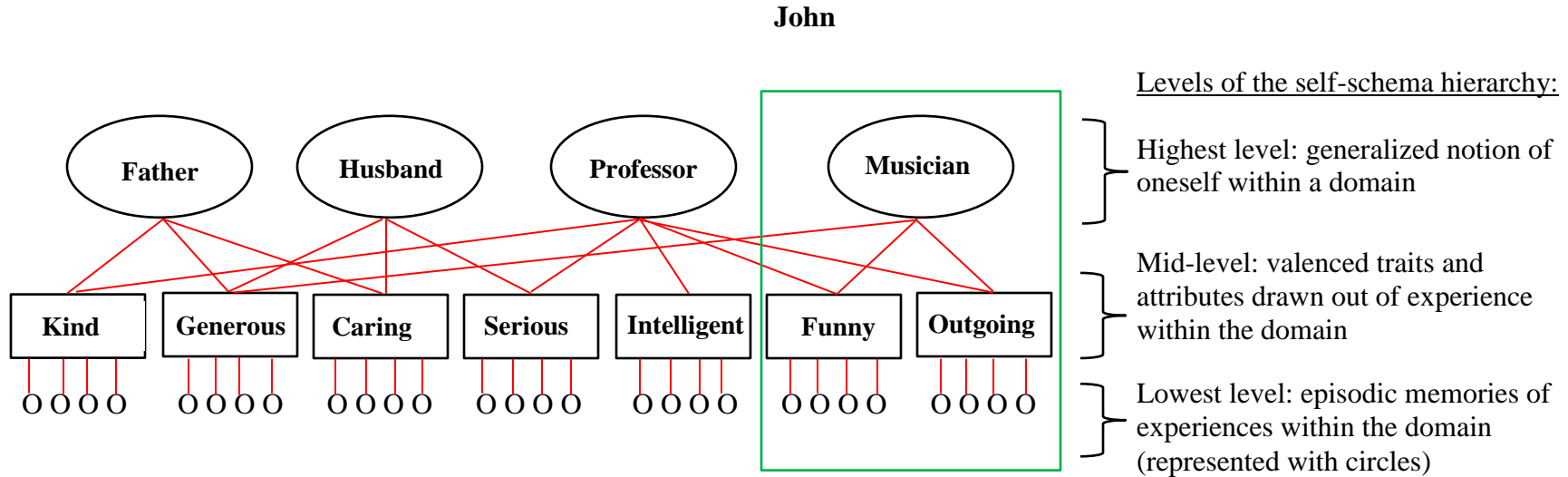
The two structural properties of self-schemas that have been found to be crucial in influencing cognitive processing and behavior are the *elaboration* and *valence* of domain-specific schemas. Elaboration is conceptually defined as the degree of influence a schema has on information processing or on the overall self-concept, based upon its structural properties (Markus & Kunda, 1986; Markus & Kitayama, 1991; McConnell, 2010; McConnell & Strain, 2007; Rafaeli-Mor & Steinberg, 2002; Scott, 1969). Markus and Kunda (1986) found that the working self-concept is informed by only a portion of the overall number of self-schemas that one possesses at any given time. Based upon this, they posited, although some self-schemas are chronically activated in working memory, other less fully elaborated self-conceptions may fluctuate in their accessibility in response to the current social context. Researchers agree that the more elaborate a self-schema is, the more likely it is to be part of the working self-concept and, thus, influence cognitive processing and behavior (Markus & Kunda, 1986; Markus & Kitayama, 1991; McConnell, 2010; McConnell & Strain, 2007; Oyserman, 2007; Schleicher & McConnell, 2005; Shadel et al., 2000).

McConnell et al. (2009) operationally defined elaboration in terms of the number of traits and attributes comprising a self-schema, and the availability of associative connections between the self-schema and other existing schematic networks. (Brown & McConnell, 2009; McConnell et al., 2009). If a self-schema has few associative connections with existing schematic networks, it is said to be *compartmentalized* and, as such, is less likely to be activated and have less

influence on self-perception and behaviors. McConnell et al. (2009) and Wheeler, DeMarree and Petty (2007) found that associative connections are made through redundancy in traits and attributes across self-schemas.

Figure 3 depicts the self-concept of a hypothetical person who has an elaborate musician self-schema. According to the Self-Schema Model of the Self-Concept this musician self-schema would be a salient part of the working self-concept because it has numerous associative connections with other self-schemas within the self-concept, increasing the frequency of activation.

Figure 3. Depiction of the self-concept of a hypothetical person named John, depicting an elaborate musician self-schema

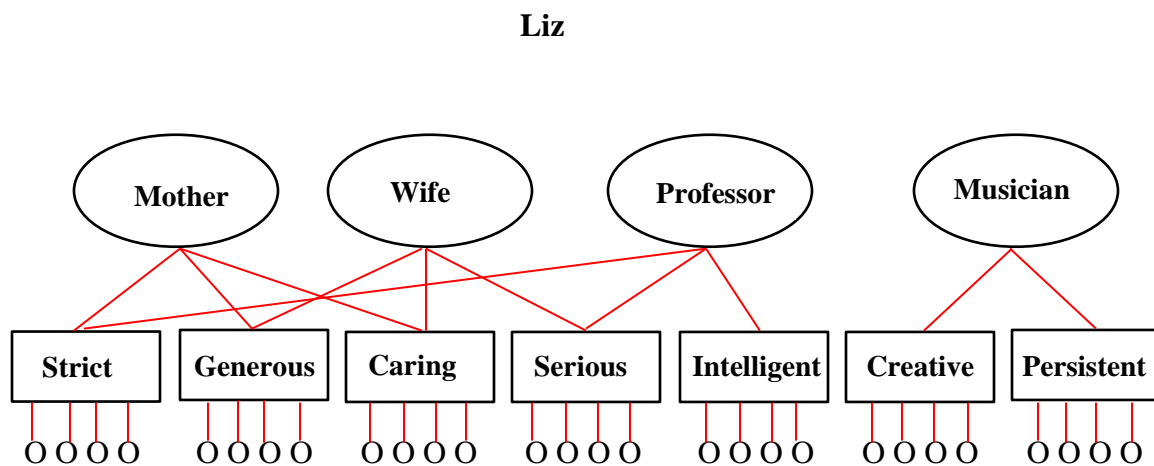


The green rectangle encompasses one *self-schema*. *Elaboration* is depicted by the number of traits and attributes supporting a domain-specific self-schema and red lines linking self-schemas based upon redundant traits and attributes. According to the Self-Schema Model of the Self-Concept, John's musician self-schema would be chronically activated, and thus be highly influential in driving his self-perception, interpretation of experiences and behavior, because of the degree of overlap in traits and attributes with other self-schemas within the self-concept. The figure depicts the *availability* of four self-schemas (John's father schema, husband schema, professor schema, and his musician schema). Ovals represent the highest level of the self-schema hierarchy, the generalized notion of one's self within a domain of experience. The rectangles represent the mid-level comprised of personal traits and attributes

drawn out of one's experiences within the domain. The circles represent the lowest level of the hierarchy, episodic memories of personal experiences within a domain. The model is adapted from McConnell & Strain (2007) and Stein (1995).

In contrast, Figure 4 depicts the self-concept of a hypothetical person who has a compartmentalized musician self-schema, due to a lack of redundancy in traits and attributes with the remainder of the self-concept. According to the Self-Schema Model of the Self-Concept, the music-related self-schema would be infrequently activated, minimizing its influence on self-perception and behavior.

Figure 4. *Depiction of the self-concept of a hypothetical person named Liz, depicting a compartmentalized music-related self-schema*



According to the Self-Schema Model of the Self-Concept, Liz's music-related self-schema would not be chronically activated due to the lack of redundancy in traits and attributes between the music-related self-schema and the remainder of the self-concept, and thus not be influential in informing her self-perception, interpretation of experiences, and behavior.

Valence refers to the degree of positivity or negativity associated with one's overall self-concept, with individual domain-specific self-schemas, or with the traits and attributes supporting domain-specific self-schemas (McConnell & Strain, 2007; Stein, 1995). The Self-Schema Model of the Self-Concept suggests that the proportion of negative to positive attributes within a schema directly results in the negativity or positivity attributed to the overall self-schema, and ultimately the overall self-concept. The valence of domain-specific self-schemas has been found to have a strong impact on what information is both attended to and encoded within one's self-concept. Information that has the same valence as the existing schema within the domain is more readily encoded within the self-concept (Markus, 1977; Petersen, Stahlberg, & Dauenheimer, 2000; Schwartz & Waterman, 2006), while information is more likely to be overlooked or rejected if it is of the opposite valence (Bargh, 1982; Klein, 2001; Klein & Kihlstrom, 1986; Klein & Loftus, 1993; Markus, Smith, & Moreland, 1985).

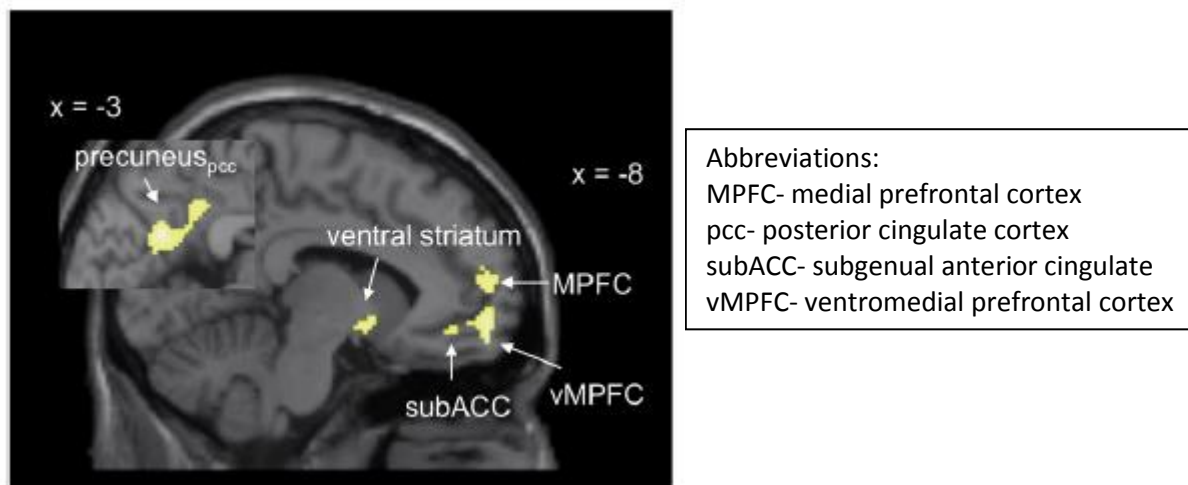
Effects of self-schemas on behavior. Beyond facilitating the processing of self-relevant information, self-schemas are strongly linked to both motivation and behavior. The literature consistently shows that people behave in a manner that is schema-congruent (Berg et al., 2010; Cooper & Shallice, 2006; Hagger, Anderson, Kyriakaki, & Darkings, 2007; Kearney & O'Sullivan, 2003; Kendzierski, 1990; Kendzierski & Costello, 2004; Oyserman et al., 2007; Pease, Brannon, & Pilling, 2006; Schwartz et al., 2010; Stein, Roeser, & Markus, 1998; Strachan & Brawley, 2008; Wheeler et al., 2007). For example, Kendzierski (1990) conducted a study exploring the link between self-schemas and exercise behavior. This study revealed that individuals with an exercise self-schema endorsed more words and phrases related to exercising as self-descriptive in comparison to those without an exercise self-schema (aschematics), took less time to make schema-consistent judgments, recalled more specific instances of past exercise

behavior, and predicted that they were more likely to engage in future exercise behavior. Furthermore, individuals who considered themselves as exercisers were more likely to report undertaking an exercise program and maintaining the exercise program in comparison to persons without an exercise-related self-schema. These findings suggested that having a well-established framework for perceiving one's self within a specific domain enhances performance of behavior within that domain. Similar results were found by Kendziersky and Whitaker (1997), who examined the role of the self in linking dieting intentions with dieting behavior among a sample of 60 female undergraduate students currently dieting to lose weight (37 who possessed a dieting-related self-schema, and 23 who did not possess a dieting-related self-schema). The researchers found that availability of a dieting-related self-schema moderated the relationship between dieting, dieting intentions and dieting behavior, with persons possessing a dieting-related schema showing a significant correlation between dieting intentions, and their dieting behavior. No such correlations were found between persons who did not possess a diet-related self-schema and dieting intentions and behaviors.

Effects of self-schemas on non-conscious information processing. Recent functional magnetic resonance imaging (fMRI) studies have identified the specific brain regions associated with schematic processing, including the left and right precuneus (pcc), left ventromedial prefrontal cortex (vMPFC, Brocas area (BA) 11), left and right medial prefrontal cortex (MPFC, BA 10), left ventral striatum, left sub anterior cingulate cortex (SubACC, BA 32), left parahippocampal gyrus, right inferior temporal gyrus, and right inferior occipital gyrus (Rameson, Satpute, & Lieberman, 2010; Satpute & Lieberman, 2006). Figure 5 and Figure 6 illustrate the neural correlates of schematic and non-schematic processing identified by Rameson et al. (2010). The researchers presented 18 participants who were schematic for an athlete

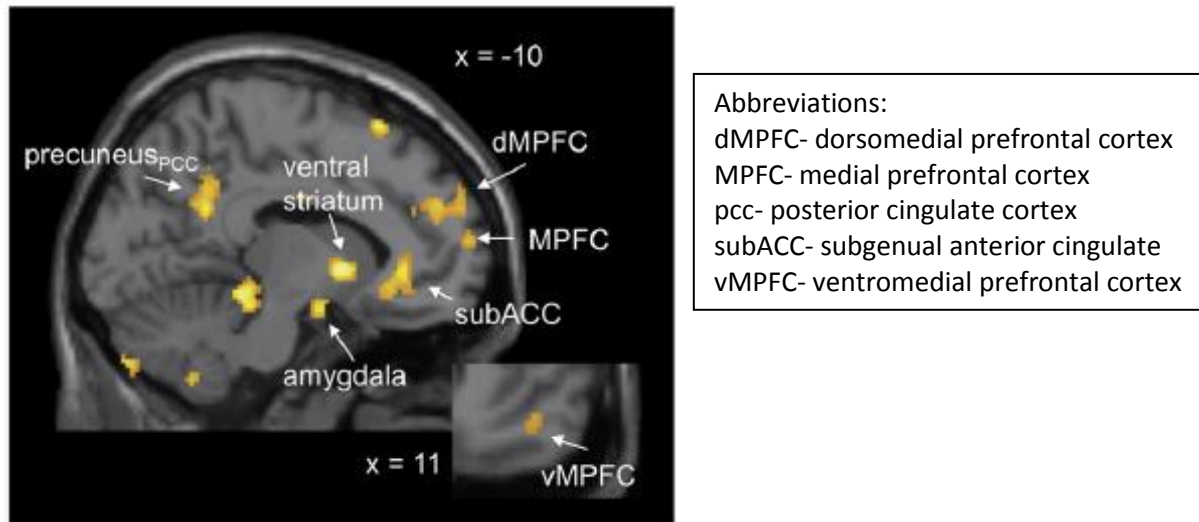
schema with words and images related to sports as well as words and images unrelated to athleticism (e.g., science and math), while participants underwent fMRI imaging. Figure 5 illustrates an exemplar of the neural correlates of schematic processing.

Figure 5. *fMRI imaging of neural correlates of schematic processing, published in Rameson, Satpute and Lieberman (2010)*



In contrast, Figure 6 illustrates the neural correlates of processing information within a domain in which one does not possess a self-schema. Both images are from the same individual and vary only in the self-relevance of the stimulus presented. Comparison of these images reveals that schematic networks (self-schemas) are located and function quite separately from effortful, purposeful thought, with schematic networks facilitating expedited, non-conscious information processing.

Figure 6. *fMRI* imaging of neural correlates of non-schematic processing, published in Rameson, Satpute and Lieberman (2010)



Self-schemas as targets for therapeutic intervention. Interventions researchers have recently capitalized on the link between availability of domain-specific self-schemas and behavior within the associated domain, by working with clients to develop more health- promoting schemas (Avants & Margolin, 2004; Kendzierski & Costello, 2004; Shadel et al., 1996; Stein & Corte, 2007). For example, Stein and Corte (2007) examined the structural properties of the self-concept and availability of a fat bodyweight schema, among a sample of 26 individuals diagnosed with anorexia nervosa, 53 individuals diagnosed with bulimia nervosa, and 32 individuals in a community control group. Researchers determined that women experiencing anorexia nervosa and bulimia nervosa possessed a self-concept comprised of fewer positive self-schemas, more negative self-schemas, and highly interrelated self-schemas compared to individuals in the community control group. In addition, it was found that women experiencing bulimia nervosa showed availability of a fat self-schema (Stein & Corte, 2008; Stein, Corte, & Ronis, 2010). Founded upon the premise that elaboration of additional, positively valenced

self-schemas outside of the domain of disordered eating would decrease activation and influence of the fat self-schema, the researchers then developed an identity intervention program designed to build new positive, self-schemas separate from other existing conceptions of the self. In order to test the intervention, women experiencing anorexia nervosa or bulimia nervosa were randomly assigned to the identity intervention program ($n = 34$) or supportive psychotherapy ($n = 35$) and followed at one, six, and 12 months post-intervention. It was determined that the identity intervention program was more effective in fostering development of positive self-schemas, and resulted in decreased desire for thinness, increased psychological well-being, and improved functional health. Both interventions were equally effective in reducing eating disorder symptoms through the 12-month follow-up period (Stein, Corte, Chen, Nuliyalu, & Wing, 2013). Correspondingly, if the structural properties of the self-concept that support self-perception and behavior within the domain of drinking are identified, interventions could conceivably be developed to alter the influence of drinking-related self-schemas.

The Self-Schema Model of Impaired Problem Recognition within Alcohol Use Disorder (SSM-IPR)

Grounded within the preceding body of self-schema literature, it is posited in the Self-Schema Model of Impaired Problem Recognition:

1. Individuals experiencing an alcohol use disorder with low problem recognition possess a drinking-related self-schema that is positively valenced.
2. As the drinking-related self-schema becomes more elaborate, drinking patterns become increasingly automatic and reflexive.

3. As one continues to accumulate negative drinking-related experiences, the content of the drinking-related self-schema shifts in valence from positive to negative and becomes compartmentalized. This compartmentalization results in impaired problem recognition.
4. As the drinking-related self-schema becomes the most elaborate and, as such, predominant schema, it begins to overshadow the remaining self. This is exacerbated by the loss of social roles that one can encounter with chronic alcohol use. However, increased elaboration of negatively valenced content also results in increased problem recognition.

The SSM-IPR is founded on the premise that impaired problem recognition is a direct result of the structural properties and functioning of the drinking-related self-schema. Each tenet in the SSI-IPR model reflects specific changes within the structural properties of the drinking-related self-schema that result from personal experiences within the domain of drinking. The tenets are discussed in detail below.

Tenet 1: Individuals experiencing an alcohol use disorder with low problem recognition possess a drinking-related self-schema that is positively valenced. The Self-Schema Model of the Self-Concept dictates that information must be encoded within a self-schema to influence self-referential judgments, decisions, and behaviors, and the more elaborate the schema, the more influence it will have on overall cognitive processing. However, the addictions literature suggests that encoding of negative drinking-related information may be impaired within AUD due to three processes: misattribution, positivity bias, and neurotoxic damage. It is posited by the SSM-IPR that initially these three processes promote the elaboration of a predominantly positively valenced drinking-related self-schema, while

preventing the elaboration of a drinking-related self-schema that is reflective of the actual degree of one's problematic drinking.

Misattribution. Misattribution is defined as erroneously attributing a recollection or idea to a non-self-referential source (Denzin, 1993; Greenwald, 1980; Horowitz, 1986; Wing, 1996; Wing & Hammer-Higgins, 1993). The addictions literature suggests that individuals experiencing AUD are particularly vulnerable to attribution errors (Forchuck, 1986; Green, Lightfoot, Bandy, & Buchanan, 1985; Harvey & Weary, 1984; Kelley & Michela, 1980; Logan, Henry, Vaughn, Luk, & King, 2012; Manousos & Williams, 1998; Maruna & Mann, 2006; McMahon & Jones, 1992; Pennock & Poudrier, 1978; Wing & Hammer-Higgins, 1993).

This phenomenon was exemplified in the grounded ethnological study conducted by Wing and Hammer-Higgins (1993). Researchers examined patterns of attribution among 42 individuals diagnosed with an AUD who were experiencing impaired problem recognition. The investigators found that their sample displayed a predictable pattern of responses when questioned about alcohol use. These patterns included 1) refusing to acknowledge connections between life problems and drinking; 2) blaming others for personal alcohol-related problems; 3) minimizing the extent or the effects of drinking; and 4) rationalizing that drinking was necessary for coping, stress reduction, or social interaction. The researchers then followed 30 persons who participated in the initial study for three years, in order to describe the internal processes that alcoholics experience as they transcend denial (Wing, 1995). The researchers determined that those who overcame impaired problem recognition were unique from those who did not in that they experienced 1) the internal process of ascribing meaning to critical life events; 2) altered their self-perception; and 3) were able to relate negative life events to alcohol use, as opposed to attributing negative events to external causes. The researchers concluded that all three properties

had to be in place before one was able to begin to transcend denial. These two studies suggest that misattributing negative drinking-related information to external causes is not only a salient feature of impaired problem recognition, but increasing internalization of such information is foundational to overcoming it.

This tendency to blame external causes for one's drinking-related problems and inability to acknowledge the connections between life problems and drinking was also eloquently illustrated within case studies reported by Denzin (1993) in his book *The Alcoholic Society: Addiction and Recovery of the Self*. The author presented and analyzed field interviews conducted with individuals experiencing AUD and individuals in recovery for AUD. Within the book one participant noted

I could never connect the problems I was having in my life and in my work with drinking. Somehow they were always disconnected. Drinking was just something I did. These problems just kept coming up. I would drink when I was down and I would drink when I was up...I would remember all of my accomplishments and connect those to my drinking. Then I would drink more. Everything that I did that was good I always connected to my drinking; never the bad things, and there were more of those! (Denzin, 1993, p. 85)

Based upon his analysis of case-studies, the author concluded that misattribution of negative drinking-related information is a critical attribute of AUD.

Consistent with the Self-Schema Model of the Self-Concept, the empirical literature also suggests that the valence of the misattributed information is a key contributing property toward misattribution. Dowd, Lawson and Petosa (1986) compared attribution styles between three groups: a sample of 25 individuals diagnosed with AUD, 25 individuals without diagnosed AUD

(college student control group), and 25 individuals recovering from AUD and not actively drinking. It was determined that the attributional style of individuals with an AUD differed significantly from the other two groups in that persons with an AUD and not in recovery displayed decreased internalization of negative information, and increased internalization of positive information (Dowd, Lawson, & Petosa, 1986). Therefore, a strong and diverse body of literature supports the notion that misattribution of negative drinking-related information is a salient feature of AUD, and is a central feature of impaired problem recognition.

Positivity bias. Confounding the tendency toward misattribution of negative drinking-related information is a bias toward positive information. For decades social-cognitive researchers have advanced the idea that cognitive functioning acts in a way to create and maintain an overall positive self-concept (Greenwald, 1980; Showers, 1992). This is achieved by a tendency toward focusing on positive information, and attributing it to one's self, while disregarding negative information, as was illustrated in the preceding studies. The social theorist, Greenwald, classically terms this benefactance (Greenwald, 1980). The presence of positivity bias within heavily drinking samples has been routinely documented within the addictions literature (Bruce & Jones, 2004; Corcoran & Theilbahr, 1989; Manousos & Williams, 1998; McMahon & Jones, 1992). For example, Corcoran and Thielbahr (1989) examined the relationship between explanatory styles for positive and negative events in a sample of 95 heavy and moderate-drinking college students and found that heavier-drinking participants had more global and stable explanations for positive events and attached more importance to positive events in comparison to their moderate-drinking peers, suggesting that heavy-drinkers had a tendency to be more attuned toward and overgeneralize positive life events. Similarly, Logan et al. (2012) examined the relation between experiencing positive and negative alcohol-related

consequences and one's perceptions of how likely those consequences would be to occur again in the future, among a sample of 491 undergraduate college students. Results showed that experiencing more positive drinking-related consequences in the preceding year was associated with viewing those consequences as both more likely to occur and more positive, while experiencing more negative consequences was associated with viewing them as less negative and no more likely to occur.

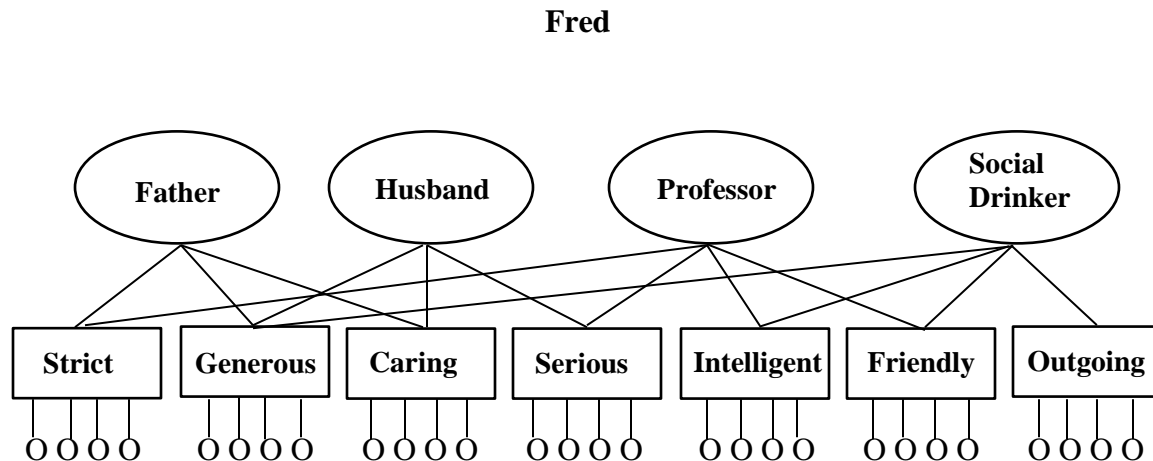
Grounded within the misattribution and positivity bias literature, two groups of addictions researchers, McMahon and Jones (1992) and Manousos and Williams (1998), proposed models of problem recognition in AUD, positing that negative drinking-related incidents are misattributed, chronically and substantially underestimated, or at least have little impact when compared with accumulated, previous positive experiences. However, despite identifying a relationship between misattribution, positivity bias, and impaired problem recognition, neither of the models describe why, on a neurocognitive level, misattribution and positivity bias occur; they merely posit that they do occur.

Neurotoxicity. In addition to misattribution or positivity bias, the neurotoxic effects of chronic alcohol consumption may also play a role in impairing the elaboration of drinking-related self-schemas and, as such, cannot be overlooked. When the regions of the brain that have been associated with self-schema formation and functioning are compared with regions that have been known to be particularly sensitive to the neurotoxic effects of long-term alcohol use, including the parietal lobes, right hemisphere, posterior inferior parietal cortex, and right posterior cortex, there is striking overlap (Goldstein et al., 2009). This overlap suggests that chronic alcohol exposure may impair encoding of significant drinking-related information and experiences in a self-referential manner (Duffy, 1995; Goldstein et al., 2009; Rinn et al., 2002;

Tarter et al., 1984).

In sum, based upon the Self-Schema Model of the Self-Concept and the addictions literature, the SSM-IPR proposes that in early drinking, individuals begin to elaborate a predominantly positively valenced drinking-related self-schema because their attention is drawn to positive drinking-related information that is consistent with their current view of their drinking as being non-problematic or “social”; while at the same time overlooking negative information because it is negatively valenced and incongruent with the existing schema. Positivity bias leads to encoding of predominantly positive information within the self-concept, while negative experiences are misattributed to external causes. The encoding of predominantly positively valenced information results in the inaccurate self-perception that drinking behavior and related consequences are non-problematic. Figure 7 depicts the self-concept reflective of a person within this phase.

Figure 7. *Depiction of the self-concept proposed within tenets one and two of the Self-Schema Model of Impaired Problem Recognition (SSM-IPR)*

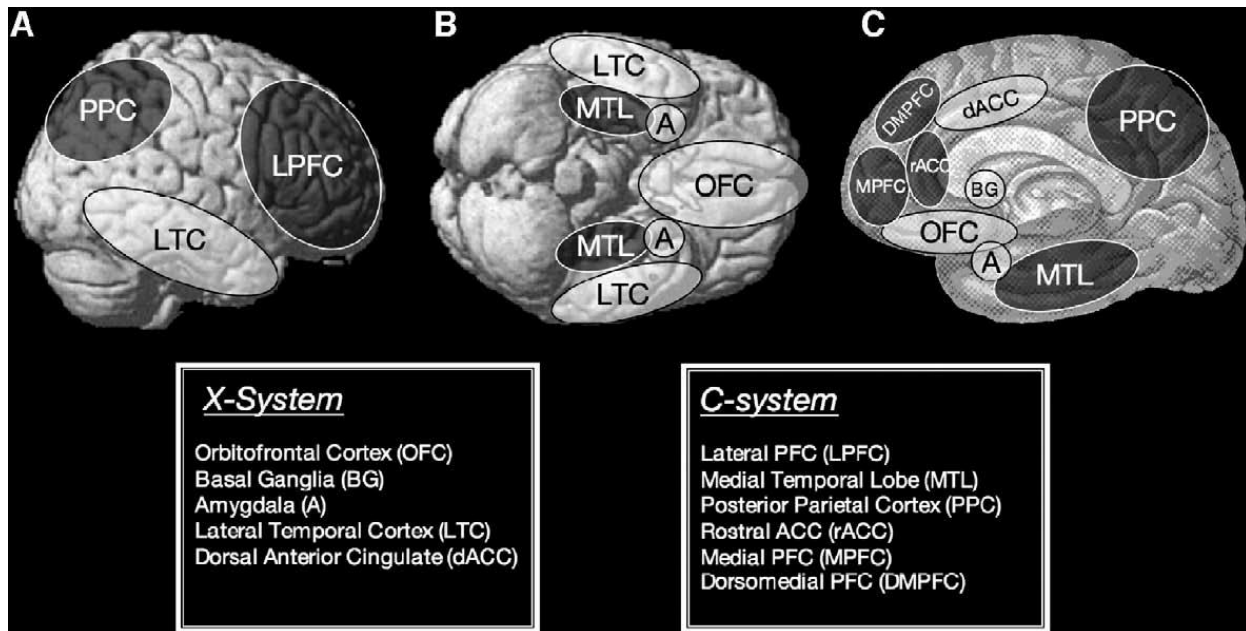


In this example, Fred’s drinking-related self-schema is positively valenced and interconnected with the remainder of the self-concept through redundancy in traits and attributes. The SSM-IPR proposes that the drinking-related self-schema would be chronically activated, and thus be highly influential in driving his self-perception, interpretation of experiences, and behavior. The positive valence of the drinking-related self-schema would give Fred the perception that his drinking is non-problematic.

Tenet 2: As the drinking-related self-schema becomes more elaborate, drinking patterns become increasingly automatic and reflexive. The Self-Schema Model of the Self-Concept posits that when self-schemas become more elaborate, they enhance the speed and efficiency of cognitive processing and enable individuals to behave in a manner that is consistent with their self-concept with little thought to, and reflection on their behavior. Recent research using fMRI technology has identified the specific brain regions and neurological networks responsible for the functioning of self-schemas (Lieberman, Jarcho, & Obayashi, 2005; Rameson

& Lieberman, 2007; Lieberman et al., 2004; Satpute & Lieberman, 2006). Lieberman, Jarcho and Satpute (2004) and Satpute and Lieberman (2006) found that two networks of neural structures were responsible for social cognition: the X-system (for the “x” in reflexive), which is automatic and has been attributed to high-experience domain judgments, and the C-system (for the “c” in reflection), which is responsible for low-experience domain judgments, including effortful social cognition and propositional thought (Lieberman et al., 2004). In order to distinguish between the two systems, Lieberman and Satpute (2006) examined the neural responses of individuals who possessed strong self-schemas for either acting or athletics using fMRI imaging, while they judged the trait descriptiveness of trait words related to acting or athletics. Retrieval of nonschematic self-knowledge was relatively slow and was associated with activity in dorsomedial prefrontal cortex and medial temporal lobe, and thus associated with the C-system, whereas automatically accessible schematic self-knowledge was associated with activity in ventromedial prefrontal cortex, amygdala, ventral striatum in the basal ganglia, lateral temporal cortex, and medial parietal cortex, and thus associated with the X-system. Lieberman’s work revealed that much social experience is evaluated and interpreted outside of our awareness and separately from deliberate thought through the X-system. Figure 8 compares and contrasts the locations of the X-system and the C-system.

Figure 8. *Neural correlates of the C-system and X-system displayed on a canonical brain rendering from (A) lateral, (B) ventral, and (C) medial views. Published in Satpute and Lieberman (2006)*



When viewed in light of Lieberman’s work (Lieberman, Jarcho & Obayashi, 2005; Lieberman, Jarcho & Satpute, 2004; Rameson, Satpute & Lieberman, 2010; Satpute & Lieberman, 2006), a recent study performed by Krienke et al. (2014) supports the notion that drinking-related information is encoded within the X-system and, as such, is relied upon for reflexive judgments and behaviors. The researchers presented 30 individuals diagnosed with DSM-IV alcohol dependence who had been sober for four days, with alcohol-related stimulus pictures in order to identify brain regions associated with self-referential information processing and craving. Using fMRI scanning during stimulus presentation, it was determined that the inferior parietal lobe, the medial temporal lobe, the inferior frontal gyrus, the postcentral gyrus,

and the precuneus were all strongly activated (Krienne et al., 2014). The identified brain regions have been traditionally associated with processes of memory, self-control, and self-reflection. Moreover, when compared to Lieberman's results detailed in Figure 5 of this review, there is significant overlap with the regions attributed to the reflexive X-system.

From a qualitative perspective, Denzin (1993) illustrated the lived experience of the automaticity of schematic processing when one participant in recovery for an AUD relayed:

I found myself in a motel with an empty whisky bottle, broken glasses, and wearing the suit I had worn to a conference on the weekend. It was Wednesday morning. I couldn't figure out what I was doing there. Then I remembered a fight I'd had with my wife before I left for the conference. She said, "Don't Drink!" And I said "What makes you think I will?"...Then I remembered I'd had a drink after my presentation which had gone well. Everyone was toasting me. It made sense to have a drink. Why not? I had two drinks and got mad at my wife for her thinking I couldn't control it. Then I bought drinks for everybody. I can't remember what happened after that, except leaving and taking a cab. I guess that's how I got in the motel. Once I'd figured it all out it made sense. I cleaned up, shaved, ordered a clean suit of clothes and went to the bar and had a drink with lunch. (Denzin, 1993, p. 68)

Similar accounts of reflexive or patterned drinking triggered by stressful social or personal situations are detailed throughout the qualitative addictions literature (Hull, 1981; Hull, Young, & Jouriles, 1986; Wing, 1995; Wing & Hammer-Higgins, 1993).

Tenet 3: As one continues to accumulate negative drinking-related experiences the content of the drinking-related self-schema shifts in valence from positive to negative and becomes compartmentalized. This compartmentalization results in impaired problem

recognition. The Self-Schema Model of the Self-Concept dictates that self-schemas fluctuate in their accessibility due to their degree of elaboration and integration with the remaining self-concept (Brown & McConnell, 2009; McConnell et al., 2009). If a schema is compartmentalized away from the remainder of the self-concept, then it will be more rarely accessed and, thus, not relied upon to make self-referential judgments. According to the Self-Schema Model of the Self-Concept this compartmentalization occurs due to a lack in redundancy of traits within the compartmentalized schema and other schemas within the self-concept. The SSM-IPR proposes that as one continues to consume alcohol to a problematic degree, he or she begins to accumulate negative drinking-related experiences. Although, initially, many of these experiences can be easily misattributed, by sheer number and severity of incidences, they overwhelm cognitive maneuvers to maintain an overall positive self-concept, resulting in their encoding within the drinking-related self-schema. It is proposed that as the drinking-related schema elaborates and becomes more negative in valence, it loses redundancy with the existing self-concept because there is little consistency in traits between the negatively valenced drinking-related self-schema and other existing positively valenced schemas.

Such compartmentalization has been well documented within the clinical addictions literature, as well as within three models of impaired problem recognition (Forchuck, 1986; Partington, 1970; Pennock & Poudrier, 1978). Pennock and Poudrier (1978) authored a cognitive dissonance model of impaired problem recognition founded upon the premise that the self-concept functions in a manner to preserve an overall positive self-image. The researchers posited that one's "alcoholic concept," which is "viewed in rather negative terms, as weak, dangerous and ill," (p. 918) is contrary to the positive self-image. Therefore, it was proposed that equating self with "alcoholic" is inconsistent, and produces dissonance, and that the

subsequent dissonance results in the splitting or compartmentalization of the self between one's "sober-self" and one's "high-self."

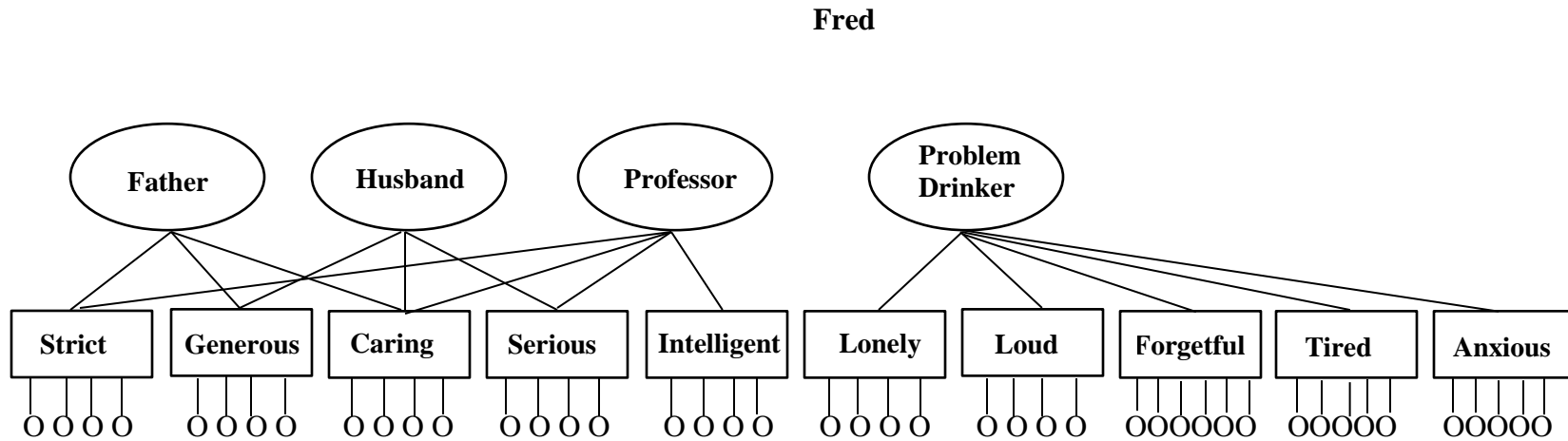
Likewise, Forchuck (1986) proposed that the "negative alcoholic stereotype" which depicts the problem-drinker as uncontrolled, negligent, insensitive, irresponsible, self-centered, lazy, etc., conflicts with one's existing, more positive self-conception, resulting in dissonance. In order to resolve this dissonance, the author proposed that one can a) deny alcoholism, b) accept a more negative self-concept, or c) reject the alcoholic stereotype. When testing this model, the authors found that, indeed, self-concept and self-esteem were highest among individuals with higher levels of denial, and those who accepted their alcoholism or admitted to a problem had a significant relationship between their ratings of traits associated with "alcoholics" and "myself," prompting the researchers to conclude that at some point those individuals had come to terms with, or assimilated, the alcoholic stereotype.

Similarly, Denzin (1993) founded his model of addiction and recovery upon the premise that individuals experiencing AUD possess a "divided self." It was proposed that alcoholism is a disease in which negative emotions divide the self into two opposite and, often warring, inner factions consisting of the sober self, and the intoxicated self. The model posited that the drinker is trapped within an interactional circuit of progressively differentiated alcoholic and nonalcoholic conduct, termed schismogenesis, which transforms his or her life into a painful field of negative, contrasting emotional experience. If unchecked, the author noted this relationship moves slowly toward self-destruction (Denzin, 1993). According to Denzin (1993), by dividing one's self-concept into two discrete and opposing selves, the core, relatively positive self can be maintained as negative experiences can be attributed to the isolated "intoxicated" self or external causes. Therefore, the researchers proposed one's self-perception can be maintained,

and even bolstered, as negative information is isolated from the remaining self-concept. However, as was seen within the preceding misattribution/positivity bias models of impaired problem recognition, the compartmentalization models fall short of detailing how compartmentalization results in impaired problem recognition on a neurological level.

Grounded within the Self-Schema Model of the Self-Concept, the SSM-IPR posits compartmentalization of the drinking-related self-schema results in impaired problem recognition because of the lack of redundancy in traits and attributes between the drinking-related self-schema and the rest of the self-concept. The Self-Schema Model of the Self-Concept dictates that the more elaborate a schema is (defined as being comprised of many traits and having redundancy in traits and attributes with other existing self-schemas), the more frequently it will be accessed and as such the more influence it will have over the self-concept and self-perception. If the overall self-concept is composed of predominantly positively valenced traits and attributes, there is little redundancy in content with the negatively valenced drinking-related self-schema and, as such, fewer associative connections with existing schematic networks. Figure 9 depicts the self-concept reflective of a person within this phase.

Figure 9. *Depiction of the self-concept proposed within tenet three of the Self-Schema Model of Impaired Problem Recognition (SSM-IPR)*

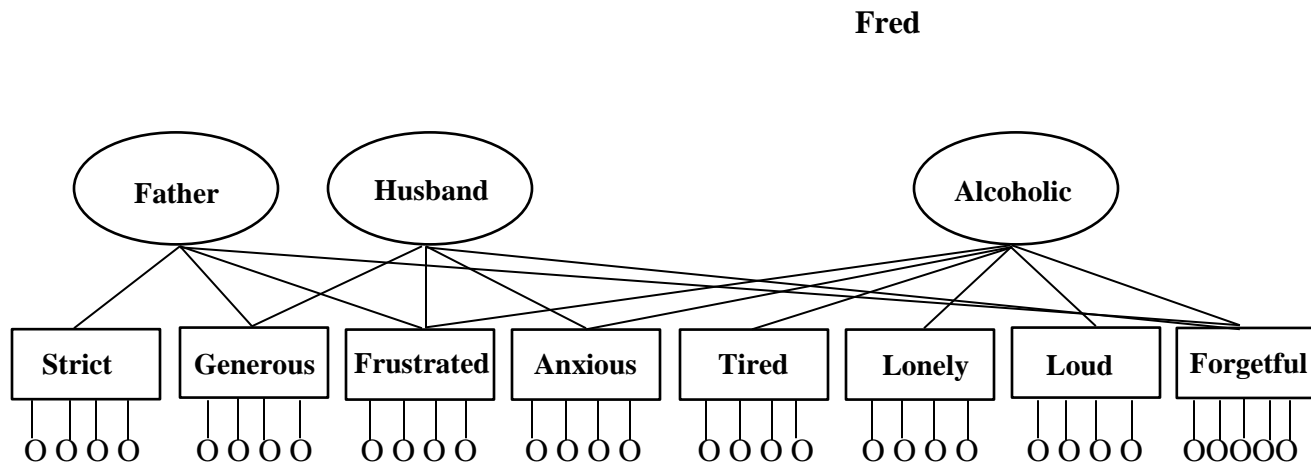


In this example, Fred’s drinking-related self-schema is negatively valenced and compartmentalized due to a lack of redundancy in traits and attributes with the remainder of the self-concept. The SSM-IPR proposes that the drinking-related self-schema would not be chronically activated, and thus not be influential in informing Fred’s self-perception, interpretation of experiences and behavior.

Tenet 4: As the drinking-related self-schema becomes the most elaborate and, thus, predominant schema, it begins to overshadow the remaining self. This is exacerbated by the loss of social roles that one can encounter with chronic alcohol use. Increased elaboration and negative valence of the drinking-related self-schema results in improved problem recognition. The Self-Schema Model of the Self-Concept dictates that self-schemas are formed over time as behavioral experiences accumulate, and similarities across episodes are extracted. Therefore, as drinking becomes an increasingly salient part of one's life, elaboration of the drinking-related self-schema is inevitable. The SSM-IPR proposes that this phenomenon alone, or enhanced by the social losses that often accompany drinking, eventually results in elaborating the drinking-related self-schema to the degree that it overshadows the remaining self-concept, becoming the driving schema of one's perception and behavior.

As was detailed within the Self-Schema Model of the Self-Concept, the self-concept is comprised of multiple, domain-specific self-schemas. One might have an employee schema, a spouse schema, a friend schema, a parent schema, an athlete schema, a drinker schema, etc., depending upon their own social experiences. If suddenly he or she suffers a loss within one of those domains, for example, they lose their job, then they will also suffer the loss of that particular self-aspect. The schema literature suggests that this loss leads to a shrinking or narrowing of the self-concept, referred to as ego atrophy (Fine & Juni, 2001). As social losses occur and the drinking-related self-schema elaborates with continued drinking, it is proposed by the SSM-IPR that the drinking-related self-schema begins to become the most influential schema within the self-concept. It is also posited that once the drinking-related self-schema becomes a predominant self-schema, problem recognition increases as it is now chronically activated and negatively valenced. Figure 10 represents the self-concept reflective of a person in this phase.

Figure 10. *Depiction of the self-concept proposed within tenet four of the Self-Schema Model of Impaired Problem Recognition (SSM-IPR)*



In this example, the content of Fred’s drinking-related self-schema is negatively valenced and interconnected with the remainder of the self-concept through redundancy in traits and attributes. In addition, Fred has lost his job, increasing the proportion of his self-concept comprised by the drinking-related self-schema. The SSM-IPR proposes that the drinking-related self-schema would be chronically activated, and thus be highly influential in driving Fred’s self-perception, interpretation of experiences, and behavior. The negative valence of the drinking-related self-schema would give Fred the perception that his drinking is problematic.

Correspondingly, several studies have found that experiencing significant social losses is closely related to increasing problem recognition within AUD (Blume, Schmaling, & Marlatt, 2006; Simpson & Tucker, 2002; Stewart & Connors, 2007; Wing, 1995; Witmer, 1997). For example, Simpson and Tucker (2002) examined temporal sequencing of alcohol-related problems, problem recognition, and help-seeking, among a sample of 101 problem-drinkers. The researchers determined that problematic alcohol use preceded the occurrence of negative alcohol-related consequences including legal problems, relationship problems, and job and financial problems. Furthermore, it was determined that negative alcohol-related consequences occurred proximal in time to problem recognition (Simpson & Tucker, 2002). In addition, a study by Blume et al. (2006) examined the relationship between recent drinking consequences and motivation to change within a sample of 120 heavy alcohol users and found that greater intrapersonal consequences predicted greater contemplation scores. Together these studies reveal that social losses and accumulation of negative drinking-related experiences can be associated with increasing problem recognition.

Implications for Research and Clinical Practice

Although the purpose of this report is to propose a self-schema model of impaired problem recognition, the value and utility of using the Self-Schema Model of the Self-Concept extends far beyond explaining the cognitive mechanisms undergirding impaired problem recognition alone. Employing a self-schema model also illuminates possible new directions for treatment and recovery. Based upon the Self-Schema Model of the Self-Concept it can further be posited that,

1. Recovery begins with elaboration of a new and conflicting self-schema (the recovery-schema), which becomes more influential and reliable as experiences in recovery accumulate.
2. As new self-schemas elaborate, one accesses the drinking-related schema less frequently, resulting in decreased elaboration and influence.
3. The ease with which one lapses into old drinking habits results from the availability of enduring schematic networks. Although the drinking-related schema decreases in elaboration, it still remains available.

Outside of the field of AUD, self-schemas have received increased attention as favorable targets for therapeutic intervention for addictions because of the critical role that they play in self-perception and behavior (Avants & Margolin, 2004; Avants et al., 2000; Kendzierski & Costello, 2004; Margolin et al., 2006; Oyserman et al., 2006; Shadel et al., 2000). For example, Litz, Payne and Colletti (1987) identified availability of a smoking-related self-schema, and determined that the smoking-related self-schema enhanced processing of smoking-related information. Building upon this literature, Shadel and Mermelstein (1996) determined that smoking behavior was facilitated by the availability of an elaborate smoking-related self-schema, while successful abstinence from smoking was supported by availability and degree of elaboration of an “abstainer” self-schema. Shadel et al. (1996) then examined how elaboration of the smoker and abstainer self-schemas changed over time with the use of a cognitive behavioral intervention targeting the schemas. The researchers found that with the intervention and over time, the abstainers’ smoker self-schema decreased in elaboration and their abstainer self-schema increased in elaboration. Despite the development of promising schema-based interventions

within multiple health-related fields, such interventions remain relatively unexplored within the domain of AUD.

The Self-Schema Model of Impaired Problem Recognition (SSM-IPR) is the first model of impaired problem recognition to explain the cognitive mechanisms that undergird the phenomenon of impaired problem recognition at the neurocognitive level. According to the model, the structure of the self-concept is critical to creating and resolving impaired problem recognition. Of particular influence is the availability, elaboration, and valence of one's drinking-related self-schema. Future research should be directed toward empirically testing and verifying the tenets of the SS-ISPR. Once the structural properties of the drinking-related self-schema are identified, theoretically and empirically grounded interventions addressing impaired problem recognition can be pursued.

Conclusion

The Self-Schema Model of the Self-Concept elucidates the structural and functional properties of the self-concept, providing a means for studying how properties of the self-concept influence self-perception and behavior. Grounded within the Self-Schema Model of the Self-Concept and the addictions literature, this report proposed the Self-Schema Model of Impaired Problem Recognition in order to identify the structural properties and functioning of the self-concept that undergird impaired problem recognition. The Self-Schema Model of Impaired-Problem Recognition allowed for a deeper understanding of the complex cognitive processes that result in impaired problem recognition within alcohol use disorder, and has the capacity to provide guidance in the pursuit of greatly needed interventions targeting the phenomenon.

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CHAPTER FOUR

SELF-SCHEMAS AS THE COGNITIVE FOUNDATIONS FOR IMPAIRED PROBLEM RECOGNITION IN ALCOHOL USE DISORDER

Introduction

Impaired problem recognition has been identified as the primary barrier that must be overcome in order for one to perceive the need for, and seek assistance for alcohol use disorder (AUD) (Duffy, 1995; Howard et al., 2002; Miller, 2001; Rinn, Desai, Rosenblatt, & Gastfriend, 2002; Stewart & Connors, 2007; Tarter, Alterman, & Edwards, 1984; Verdejo-Garcia & Perez-Garcia, 2008; Wing, 1995; Wing, 1996; Wing & Hammer-Higgins, 1993). In addition, the addictions literature consistently identifies impaired problem recognition as a barrier that must be overcome in order for AUD treatment and recovery to be successful (Allan, 1991; Edlund, Booth, & Feldman, 2009; Goldsmith & Green, 1988; Hedden & Gfroerer, 2011; Rice, Hagler, & Tonigan, 2014). Despite the availability of numerous cognitive, social and behavioral treatment options aimed at assisting individuals experiencing AUD in achieving and maintaining recovery, impaired problem recognition remains a resolute obstacle to treatment-seeking and recovery (Project MATCH, 1997; Roth & Fonagy, 2006).

It is estimated that currently more than 18.5 million Americans meet diagnostic criteria for an AUD (Substance Abuse and Mental Health Association, 2011). Based upon recent findings from a national survey, only 8.5% of people who meet diagnostic criteria will receive treatment for an AUD and only 2.8% of people who meet diagnostic criteria identify that they

need treatment for an AUD (Substance Abuse and Mental Health Association, 2011). These statistics illustrate that impaired problem recognition persists as a prevalent issue within the United States.

The Cognitive Origins of Impaired Problem Recognition in Alcohol Use Disorder

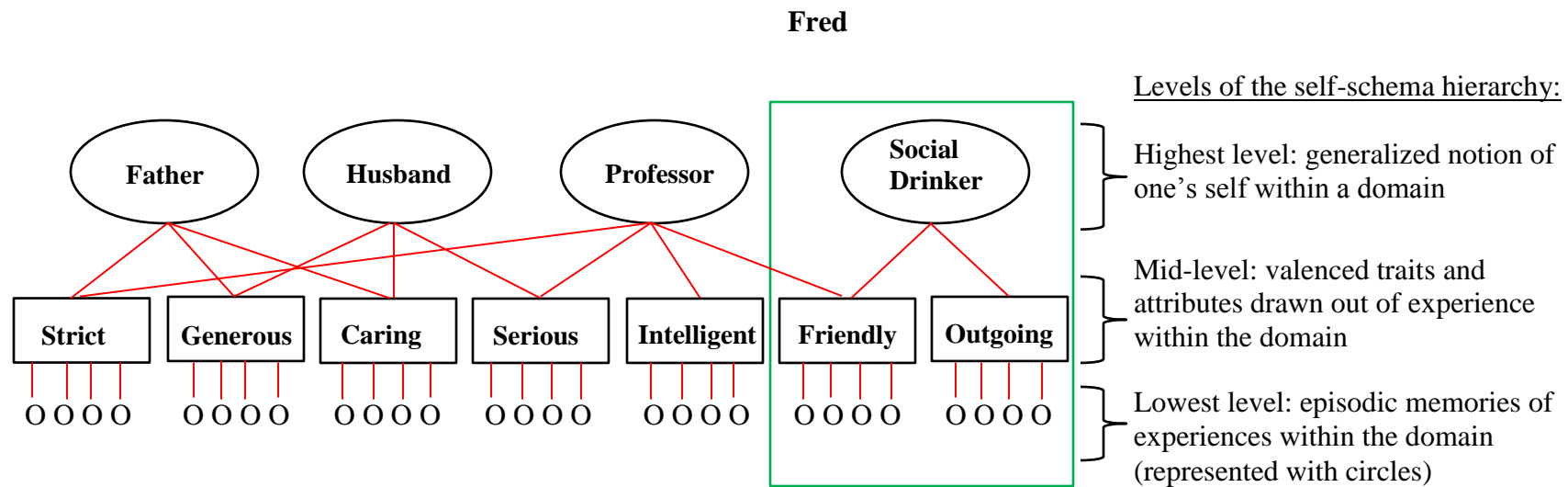
Within the addictions literature, impaired problem recognition is defined as an inability to recognize that addiction-related behaviors are causing financial, social or emotional dysfunction in one's life, and a lack of intention to change addiction-related behavior in the foreseeable future (Denzin, 1993; Dorpat, 1983; Duffy, 1995; Goldstein et al., 2009; Manousos & Williams, 1998; Prochaska & DiClemente, 1982; Rinn et al., 2002; Tarter et al., 1984; Wing & Hammer-Higgins, 1993). It is most frequently attributed to disturbances within cognitive processing (Denzin, 1993; Dorpat, 1983; Forchuck, 1986; Hull, 1981; Hull & Reilly, 1983; McMahon & Jone's, 1992; Nye, Agostinelli, & Smith, 1999; Pennock & Poudrier, 1978; Prochaska & DiClemente, 1982; Tarter et al., 1984; Wing, 1995; Wing & Hammer-Higgins, 1993), and specifically to disturbances in processing of self-referential information (Banaji & Steele, 1989; Hull, 1981; Hull & Schnurr, 1986; Sachs, 2003). Self-referential information refers to any information that relates specifically to one's self, drawn out of social experiences or interactions within one's environment. However, little is known regarding the neurocognitive structures and functioning that create these disturbances.

In the Self-Schema Model of the Self-Concept, Markus (1977) explicated the structural and functional properties of the self-concept, providing a means for studying how properties of the self-concept influence self-perception and behavior. Thus, applying a self-schema model to the phenomenon of impaired problem recognition has the potential to identify the key structural properties and functioning of the self-concept that result in impaired problem recognition.

The Self-Schema Model of the Self-Concept

According to the Self-Schema Model of the Self-Concept, the self-concept is comprised of multiple domain-specific, self-referential neurological networks called self-schemas. Each schema is hierarchically structured. The highest level of the self-schema hierarchy consists of a generalized notion of one's self within a specific domain of experience. The mid-level is composed of associated positively or negatively valenced traits and attributes obtained from experience within the domain. The lowest level of the self-schema hierarchy is composed of episodic memories of experiences within the domain (Cantor & Kihlstrom, 1989; Markus & Wurf, 1987; McConnell, Rydell, & Brown, 2009; Schleicher & McConnell, 2005). Figure 11 depicts the structure of the overall self-concept including domain-specific self-schemas.

Figure 11. *Depiction of the self-concept for a hypothetical person named Fred, illustrating the structural and functional properties of the self-concept*



Ovals represent the highest level of the self-schema hierarchy, the generalized notion of one's self within a domain of experience. The rectangles represent the mid-level comprised of personal traits and attributes drawn out of one's experiences within the domain. The circles represent the lowest level of the hierarchy, episodic memories of personal experiences within a domain. The figure depicts the *availability* of four self-schemas (Fred's father schema, husband schema, professor schema, and his drinking-related schema). The green box encompasses the *content* of one domain-specific *self-schema* (his drinking-related self-schema). *Elaboration* is depicted by

the number of traits and attributes within each schema and the red lines linking self-schemas based upon redundant traits and attributes. Model is adapted from McConnell & Strain (2007) and Stein (1995).

Availability of a domain-specific self-schema, as well as the structural properties of *valence* and *elaboration* of self-schemas, have been found to be crucial in influencing cognitive processing and behavior (Avants & Margolin, 2004; Avants, Margolin, & McKee, 2000; Kendzierski, 1990; Kendzierski & Costello, 2004; Kendzierski & Whitaker, 1997; Klein, 2001; Klein & Loftus, 1993; Margolin, Beitel, Schuman-Olivier, & Avants, 2006; Oyserman, Bybee, & Terry, 2006; Rafaeli-Mor & Steinberg, 2002; Shadel, Niaura, & Abrams, 2000). Availability refers to the presence or absence of a domain-specific self-referential knowledge structure (Higgins, King, & Mavin, 1982; Stein, 1995). If a self-referential knowledge structure is present and detectable within working memory, then the schema is deemed available (Stein, 1995).

Elaboration is defined as the degree of influence a schema has on information processing or on the overall self-concept based upon its structural properties (Markus & Kunda, 1986; Markus & Kitayama, 1991; McConnell, 2010; McConnell & Strain, 2007; Rafaeli-Mor & Steinberg, 2002; Scott, 1969). It is most commonly operationalized in terms of the number of traits and attributes comprising the mid-level of the schema (Brown & McConnell, 2009; McConnell et al., 2009), and/or the number of associative connections between a domain-specific self-schema and existing schematic networks (Linville, 1987; Rafaeli-Mor, Gotlib, & Revelle, 1999). If a self-schema has few associative connections with existing schematic networks it is said to be compartmentalized, and as such has less influence on self-perceptions and behaviors.

Valence refers to the degree of positivity or negativity associated with the traits and attributes supporting domain-specific self-schemas (McConnell & Strain, 2007; Stein, 1995). The Self-Schema Model of the Self-Concept suggests that the proportion of negative to positive

attributes within a schema directly results in the negativity or positivity attributed to the overall self-schema and, ultimately, the overall self-concept. The valence of domain-specific self-schemas has also been found to have a strong impact on what information is encoded within one's self-concept, with information being more readily encoded if it has a valence that is consistent with the valence of existing self-schemas within the domain, and more likely to be rejected or overlooked entirely if it is of the opposite valence (Klein, 2001; Klein & Kihlstrom, 1986; Klein & Loftus, 1993).

Self-Schemas in Alcohol Use Disorder

An integrative review of the literature was performed to determine what is known about the availability, structure and effect of the drinking-related self-schema among persons with AUD. Results revealed that there is a small but growing body of alcohol-related self-schema literature showing the availability of both drinking and recovery-related self-schemas. Furthermore, the review suggested that the valence and elaboration of drinking-related self-schemas are likely the key structural properties of the drinking-related self-schema that undergird self-conceptualization and behavior within the domain of drinking. However, to date the structural properties of the drinking-related self-schema have not been empirically examined. See Chapter Two for the complete integrative review.

The Self-Schema Model of Impaired Problem Recognition (SSM-IPR)

The Self-Schema Model of Impaired Problem Recognition (SSM-IPR) is founded on the premise that the structural properties of the self-concept are critical to creating and resolving impaired problem recognition within AUD. It is posited that the availability, elaboration, and valence of the drinking-related self-schema are of particular influence. For an in-depth review of the SSM-IPR with theoretical and empirical support, see Chapter Three.

Grounded within the addictions and self-schema literatures, the SSM-IPR makes four propositions. First, it is posited that misattribution of negative drinking-related information and positivity bias result in the elaboration of a drinking-related self-schema that is comprised predominantly of positively valenced content. The encoding of predominantly positively valenced information within the self-concept results in the inaccurate self-perception that drinking behavior and related consequences are non-problematic. Second, it is posited that as one continues to accumulate experience within the domain of drinking, the drinking-related self-schema becomes more elaborate. As the schema elaborates it begins to increasingly guide behavior within the domain of drinking including making drinking a patterned, relatively automatic behavior. Third, it is posited that as problematic drinking behavior persists, one begins to accumulate negative drinking-related experiences, causing the drinking-related self-schema to compartmentalize away from the remainder of the self-concept. It is proposed that this compartmentalization is caused by a lack of redundancy in traits and attributes (and thus few associative connections) between the drinking-related self-schema and other existing self-schemas. It is posited that compartmentalization results in impaired problem recognition because the drinking-related self-schema is not integrated within the overall self-concept and thus is not reliably accessed to inform self-referential judgments. Fourth, the SSM-IPR proposes that with continued drinking there comes a point that the drinking-related self-schema becomes the most elaborate and thus influential schema within the self-concept due both to the continued accumulation of negative drinking-related experiences as well as the loss of social roles that one often encounters with chronic alcohol use. Once the drinking-related self-schema becomes the dominant self-schema, problem recognition significantly improves, as now all experiences and perceptions are processed through the elaborate, negatively valenced

drinking-related self-schema.

Despite strong theoretical grounding and convincing empirical support of the tenets of the SSM-IPR, this model requires testing before interventions research can be further pursued.

Therefore, the purposes of this cross-sectional correlational study were to 1) identify the structural properties (availability, valence, and elaboration) of the drinking-related self-schema; and 2) determine the relationship between the structural properties of the drinking-related self-schema and problem recognition among individuals who meet Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) (American Psychological Association, 2013) criteria for moderate to severe AUD.

Aims and hypotheses. The following aims and hypotheses were addressed:

Aim 1. To determine the structural properties of the drinking-related self-schema among individuals with DSM-5 moderate to severe AUD.

Research Question 1. What is the availability of the drinking-related self-schema among individuals with DSM-5 moderate to severe AUD?

Research Question 2. What is the valence of the drinking-related self-schema among individuals with DSM-5 moderate to severe AUD?

Research Question 3. What is the elaboration of the drinking-related self-schema among individuals with DSM-5 moderate to severe AUD?

Aim 2. To determine the relationship between structural properties of the drinking-related self-schema and problem recognition among individuals with DSM-5 moderate to severe AUD.

H1: There is a positive relationship between negative valence of the drinking-related self-schema and problem recognition among individuals with DSM-5 moderate to severe AUD.

H2: There is a negative relationship between positive valence of the drinking-related self-schema

and problem recognition.

Aim 3. To determine the ability of valence and elaboration for the drinking-related self-schema, age, education, and quantity and frequency of drinking to explain problem recognition among individuals with DSM-5 moderate to severe AUD.

H3: Valence and elaboration for the drinking-related self-schema explain problem recognition among individuals with DSM-5 moderate to severe AUD.

Methods

Procedures

Design. A cross-sectional, correlational design was used to address the study aims and hypotheses. Approval to conduct the study was obtained from University of Michigan Institutional Review Board: Health Sciences and Behavioral Sciences Board prior to data collection

Participants

Recruitment. Participants were recruited from two sources. First, probation officers in three sobriety courts in Southwestern Michigan distributed recruitment brochures to all of the clients in their caseloads, directing potential participants to contact the primary investigator if they were interested in participating in the study. Probation officers' caseloads were composed solely of clients who had been charged with and convicted of one or more drinking-related offences and received their verdict or sentence. Second, the study was advertised using recruitment flyers posted on public bulletin boards located at local libraries and grocery stores, and Craigslist postings across Southwestern Michigan. The advertisements solicited individuals who had been convicted of any drinking-related offence within the preceding 12 months, or who had experienced at least two of the four items on the CAGE questionnaire (Ewing, 1984).

Interested persons who met the criteria were instructed to contact the principal investigator for more information.

Inclusion/exclusion criteria. The inclusion criteria for the study were 1) being of legal drinking age in Michigan (21 years and older); 2) either having been convicted of an alcohol-related offence within 12 months preceding the data collection appointment date, or answering "yes" to two or more items from the CAGE questionnaire; and 3) being able to read and write English sufficiently to complete the measures. The exclusion criteria were 1) being intoxicated at the time of data collection as evidenced by blood alcohol level (BAC) $\geq .08$ (as defined by Michigan State Police, 2014), and 2) having a MMSE-2 score below 24 (corrected for education as per Crum, Anthony, Bassett, & Folstein (1993)), because MMSE-2 scores of 23 and lower have been found indicative of possible cognitive impairment (Crum et al., 1993; Pangman, Sloan, & Guse, 2000).

Measures

All measures have been widely used in research, and have acceptable validity and reliability in diverse samples. A detailed table of study measures, including validity and reliability statistics and effect sizes for the primary study variables, is available in Appendix A.

Self-schemas. Consistent with existing self-schema research (Linville, 1985; McConnell, 2011; McConnell & Strain, 2007; Woolfolk, Novalany, Gara, Allen, & Polino, 1995), the valenced content of the self-concept was determined using a self-schema card sort task. Participants were presented with a deck of 117 index cards each of which had a trait or attribute written on it, and were instructed:

“In this part of our study, we are looking at how you describe yourself. In order to do it we will use this deck of 117 cards and recording sheets. Your task is to think of the

different aspects of yourself or your life and then form groups of traits that go together to describe that aspect of yourself or your life.

1. Take some time now to think of different aspects of yourself and your life; consider social roles, hobbies, relationships, responsibilities, personal characteristics, anything that makes you who you are.

Write the aspects of yourself and your life at the top of each list on the recording sheet.

2. Now, use the deck of cards in front of you to form groups of traits or characteristics to accurately describe yourself in the different aspects of your life that you have written down. If you think of more self-aspects during this task that you forgot to list initially, feel free to add them as you go along. You may form as many or as few self-aspects and groups of traits as you desire, and you do not need to use all of the cards; just be sure to fully describe yourself. You can also re-use cards in multiple groupings”.

After participants completed the card-sort task, if a participant had not spontaneously generated a drinking or recovery-related grouping, he or she was then asked to think of him or herself in terms of drinking and in terms of recovery (if applicable), and use the cards to describe one’s self within that area of their life.

The deck of index cards was comprised of 57 positively valenced traits or attributes (e.g., friendly, outgoing, etc.), 57 negatively valenced traits or attributes (e.g., worthless, inferior, etc.), and 3 neutral traits. In order to provide traits and attributes that would likely be most descriptive of drinking-related self-conceptualizations, three sources were used for self-descriptors. The 40 traits and attributes used in a study by Showers (1992) in their non-alcohol specific self-schema research and later in a study by McConnell et al. (2005) were used. In order to ensure traits were also self-descriptive within the domain of addiction, 71 traits and attributes were drawn from the

self-concept task used by Doebrick and Todman (2003) in their research about smoking and the structure of the self-concept. Finally, since the card-sort task had not been used among a sample of people with AUD, 20 traits were drawn from the research of McCartney and O'Donnell (1981) who explored how individuals experiencing AUD described themselves. Redundant traits were removed resulting in a 117 card, card-sort task.

In order to ensure that an adequate range of self-descriptors were provided within the deck, after participants completed the card sort task they were asked if there were any additional traits or attributes that described themselves within the domain of drinking that were not in the deck. Nearly all (99.9%) of participants said the deck covered all of the descriptors that they could think of. Two participants added an additional two traits each to their card-sort pile.

Availability. Availability of drinking-related and recovery self-schemas were measured using the methodology developed by Shadel, Mermelstein and Borrelli (1996) to measure availability of smoker and abstainer self-schemas, and modified by Corte and Stein (2007) to measure drinker and recovering alcoholic self-schemas. Participants were presented with two, four-item, 11-point Likert-type scales that focused on views of the self as a drinker and the self as a recovering alcoholic. Each item asked participants to rate the extent to which they agreed or disagreed with items designed to assess the personal significance of being a drinker (e.g., “drinking is part of who I am”) and recovering alcoholic (e.g., “I think of myself as a recovering alcoholic”). Scores were summed with high scores reflecting the extent to which being a drinker or recovering alcoholic was personally meaningful. The measure has good reliability within similar samples (Cronbach alpha for drinking-related self-schemas= 0.93, Cronbach alpha for recovery-related self-schemas= 0.95) (Corte & Stein, 2007).

Elaboration. Researchers have supported the notion that the greater number of traits composing a schema, the more elaborate and thus influential it is on cognitive processing (McConnell, 2011; Renaud & McConnell, 2002). Thus, elaboration of the drinking and recovery-related self-schemas was operationalized using the total count of cards generated to describe the self as a “drinker” and the total count of cards generated to describe the self in “recovery,” in the drinker and recovery card sort task described above.

Valence. Valence was operationalized by the number of negative cards, and the number of positive cards used within the drinking-related and recovery-related self-schemas. Self-schema card sort tasks to determine the content of self-schemas have been found to have test-retest reliability ranging from $r=0.7$ to $r=0.87$ at two weeks (Linville, 1987; Rafaeli-Mor et al., 1999; Stein, Roeser & Markus, 1998), and split-half reliability ranging from $r=0.83$ to $r=0.97$ (Rafaeli-Mor et al., 1999).

Problem recognition. The degree of problem recognition was measured using the Problem Recognition subscale of the Stages of Change Readiness and Treatment Eagerness Scale Version 8 (SOCRATES-8) (Miller & Tonigan, 1996). The 18-item paper and pencil questionnaire asks participants to rate the extent to which they agree or disagree with statements about their drinking, on 5-point scales. The measure yields subscales for Problem Recognition, Ambivalence, and Taking Steps. The measure’s authors note that high problem recognition scores indicate that the participant directly acknowledges that they are having problems related to their drinking, tends to express a desire for change, and perceives that harm will continue if he or she does not change. Low problem recognition scores indicate that the participant denies that alcohol is causing them serious problems, rejects diagnostic labels such as “problem drinker” and “alcoholic,” and does not express a desire for change (Miller & Tonigan, 1996). Cronbach alpha

for the SOCRATES-8 subscales has been found to range from 0.60 to 0.98 (Problem Recognition= 0.95-0.95, Ambivalence=0.60-0.88, Taking Steps=0.83-0.96) (Miller & Tonigan, 1996). Test-retest reliability for the SOCRATES-8 Subscales has also been found to be good (Problem Recognition $r=0.94$, Ambivalence $r=0.83$, Taking Steps $r= 0.93$) (Miller & Tonigan, 1996).

Drinking behavior. Frequency and quantity of drinking was measured using a 3-month Alcohol Timeline Followback (TLFB) activity (Sobell & Sobell, 1992). Participants were asked to complete a TLFB calendar by writing the number of standard drinks they consumed on each day of the preceding three months. The number of drinks consumed per drinking day and average number of drinking days per week were utilized for analysis. When administered to adult drinkers, the TLFB has demonstrated good test–retest reliability (Carey, 1997; Sobell & Sobell, 1992), discriminant validity (Fals-Stewart, O'Farrell, Freitas, McFarlin & Rutigliano, 2000), and concurrent validity (Sobell, Sobell, Toneatto & Shillingford, 1994).

The summed subscales of Ambivalence and Taking Steps from the SOCRATES-8 were used to determine recovery-related behavior. According to the developers of the measure, a high Ambivalence score indicates that the participant sometimes wonders if he/she is in control of his/her drinking, drinking too much, hurting other people, and/or is an alcoholic. Therefore, a high score reflects ambivalence or uncertainty. A high score also reflects some openness to reflection, as might be particularly expected in the contemplation stage of change. A low Ambivalence score indicates that the participant does not wonder whether he/she is drinking too much, in control, hurting others, or is an alcoholic. A person may score low on Ambivalence either because they “know” their drinking is causing problems, or because they “know” that they do not have drinking problems (Miller & Tonigan, 1996). A high Taking Steps score indicates

that the participant is already doing things to make a positive change in their drinking, and may have experienced some success in this regard. A low Taking Steps score indicates that the participant is not currently doing things to change their drinking and has not made such changes recently (Miller & Tonigan, 1996).

Screening and demographics measures. In addition to the study measures, participants were asked to complete four screening measures. First, the CAGE questionnaire was used on recruitment material and during the phone screening process in order to increase the likelihood that participants would meet DSM-5 criteria for AUD prior to data collection. In order to be eligible a participant had to positively endorse at least two of the CAGE items. The CAGE items were as follows: 1) “Within the past 12 months, have you felt you should cut down on your drinking?”; 2) “Within the past 12 months, have people annoyed you by criticizing your drinking?”; 3) “Within the past 12 months, have you felt bad or guilty about your drinking?”; 4) “Within the past 12 months, have you had a drink first thing in the morning to steady your nerves or to get rid of a hangover?” (Ewing, 1984, pp. 1906).1). Second, prior to data collection participants were asked to complete an alcohol Breathalyzer test ($BAC < .08$) in order to establish capacity to provide informed consent and rule out the influence of acute intoxication on cognitive measures. Third, in order to ensure baseline cognitive ability participants were asked to complete the Mini-Mental State Examination Version 2 (MMSE-2) (Folstein, Folstein & McHugh, 1975; Folstein, Folstein, & McHugh, 2010). Fourth, in order to determine that participants met DSM-5 criteria for moderate to severe AUD, participants were interviewed using the DSM-5 criteria for AUD. Consistent with the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders, endorsing four or more of the eleven diagnostic criteria was used to indicate moderate to severe AUD (American Psychological

Association, 2013). Participants were also asked to complete a general demographics questionnaire that included two items about treatment history for alcohol use and number of drinking-related convictions, and the Drug Use Questionnaire (DAST-10) (Skinner, 1982) to obtain an understanding of sample characteristics.

The demographic variables of age, level of education, and frequency and quantity of alcohol use were included in the regression models because previous research has found a relationship between these variables and problem recognition (Falck et al., 2007; Nwakeze, Magura, & Rosenblum, 2002; Rice, Hagler, & Tonigan, 2014; Small, Ounpraseuth, Curran, & Booth, 2012; Treng et al., 2012). For example, Nwakeze et al. (2002) examined the demographics variables associated with problem recognition, desire for help, and treatment readiness among a sample of 190 alcohol and substance using men and women using the services of inner-city soup kitchens in Brooklyn, New York. The researchers found that age and level of education were negatively correlated with treatment readiness and problem recognition, while frequency and quantity of substance use was positively correlated with treatment readiness and problem recognition.

Procedure

Potential participants who met eligibility criteria met individually with the researcher in a semi-private, public location to complete the study protocol in a single 1½ hour session. Participants were compensated with a \$50.00 gift card for their time and participation. All participants also received the National Institute on Alcohol Abuse and Alcoholism's brochure, titled Rethinking Drinking, that assists readers in determining healthy versus problematic levels of drinking and lists health risks related to problematic levels of drinking (National Institute on Alcohol Abuse and Alcoholism, 2010).

Data Analysis

Data were stored in the REDCap Data Management system. Analyses were completed using IBM SPSS Statistics Version 22. Table 8 displays a summary of the measures and analyses that were utilized to achieve the research aims and test hypotheses.

Table 8

Study measures and analyses to achieve aims, research questions and hypotheses

	Description	Measure	Data Analysis
Aim 1	To determine structural properties of the drinking-related self-schema		
RQ1	What is the availability?	Self-Schema Likert Task	Descriptive analysis & Wilcoxon test
RQ2	What is the valence?	Self-Schema Card Sort Task	Descriptive analysis & t-tests
RQ3	What is the elaboration?	Self-Schema Card Sort Task	Descriptive analysis & t-tests
Aim 2	Determine the relationship between structure and problem recognition		
H1	Positive relationship between negative valence & problem recognition	SOCRATES-8 & Self-Schema Card Sort Task	Pearson product-moment correlation
H2	Negative relationship between positive valence & problem recognition	SOCRATES-8 & Self-Schema Card Sort Task	Pearson product-moment correlation
Aim 3	Determine the ability of study and socio-demographic variables to explain problem recognition		Multiple regression
H3	Valence & elaboration will explain problem recognition	Self-Schema Card Sort & Self-Schema Likert Task SOCRATES-8 Timeline Follow-Back: Alcohol Demographics Questionnaire	R Square values to determine % of variance explained by the model

Results

Sample. Sixty individuals completed the study protocol. Five of the 60 participants did not meet DSM-5 criteria for moderate to severe AUD and were excluded from the main data

analysis. The final study sample was composed of 55 individuals who met DSM-5 criteria for moderate to severe AUD. Of the total sample, 64% were male, 36% were female. Mean age was 43.9 years (SD=11.4) and mean education in years of school completed was 12 (SD=2). Self-reported race of participants was 58% White, 38% African American, and 3.6% Native American. In addition, 80% of the sample self-identified as not being currently in recovery for alcohol use, while 20% reported currently being in recovery and abstinent from alcohol use. When asked about past professional treatment, counselling, and support group attendance for alcohol use, 73% reported having received some professional treatment, counselling, or attending a support group for their alcohol use in the past. Within the preceding 12 months, 54.5% of the sample reported using drugs other than alcohol, tobacco, or those required for medical reasons. Descriptive statistics for alcohol and substance-use-related variables are detailed in Table 9.

Table 9

Descriptive statistics for drinking and substance related variables

	Minimum	Maximum	Mean	SD
Number of drinking days per week (in preceding 90 days)	.00	7.00	4.44	2.65
Number of drinks per drinking day (in preceding 90 days)	.00	29.67	8.28	7.44
Lifetime number of convictions for alcohol-related offences	.00	21.00	2.15	3.23
DSM-5 Score for preceding 12 months	4.00	11.00	8.36	2.35
DSM-5 Score for preceding 3 months	.00	11.00	6.09	3.52
DAST-10 Total Score	.00	10.00	3.41	3.23

Structural Properties of the Drinking-Related Self-Schema (Aim 1)

All of the 55 participants displayed availability of a drinking-related self-schema as indicated by Self-Schema Likert Task scores. In order to determine if availability of a

drinking-related self-schema was unique to the individuals who met DSM-5 criteria for moderate to severe AUD, or if all persons with some drinking-related experience displayed availability of a drinking-related self-schema, an independent-samples Wilcoxon test was conducted. The independent-samples Wilcoxon test compared drinking-related self-schema scores from the Self-Schema Likert Task between the study sample (individuals who met DSM-5 criteria for moderate to severe AUD) and a small group (N=5) who were excluded from the full analysis because they did not meet criteria for moderate to severe AUD (DSM-5 ≤ 3). There was a statistically significant difference in self-schema scores for the DSM-5 moderate to severe group ($M= 24.47, SD=10.42$) and those who did not meet DSM-5 criteria for moderate to severe AUD ($M= 9.8, SD=8.98; w(58)= 1774.50, p=.006$). The magnitude of the difference in the means was moderate to large ($\eta^2 = 0.138$). These results indicated the availability of the drinking-related self-schema differed between those who met DSM-5 criteria for moderate to severe AUD and those who did not meet criteria, with those who met criteria having an elaborate drinking-related self-schema available.

Regarding research question two pertaining to the valence of the drinking-related self-schema, it was determined that on average the drinking-related self-schema of individuals with DSM-5 moderate to severe AUD was composed of 47% negatively valenced content ($M= 46.92, SD= 27.10$). In contrast, the remaining self-concept excluding the drinking-related schema was composed of 26% negatively valenced content ($M= 25.69, SD= 17.17$). A one-sample t-test was conducted in order to compare the percentage of negatively valenced content within the drinking-related self-schema and the percentage of negatively valenced content within the remaining overall self-concept. There was a statistically significant difference in negatively valenced content between the drinking-related self-schema and the content of the

overall self-concept ($t(54) = 12.84, p < .000$). Thus these results suggested that the content of the drinking-related self-schema was significantly more negatively valenced than the content of one's overall self-concept.

Regarding research question three pertaining to the elaboration of the drinking-related self-schema, descriptive analysis revealed that on average, the drinking-related self-schema encompassed 43% of one's overall self-concept ($M = 43.40, SD = 12.71$). Of participants who displayed availability of a recovery-related self-schema ($N = 11$), the recovery-related self-schema encompassed 3% of their overall self-concept ($M = 3.43, SD = 9.50$).

Relationship between the Structural Properties of the Drinking-Related Self-Schema and Problem Recognition (Aim 2)

To test hypotheses one and two from aim two, the relationship between valence of the drinking-related self-schema and problem recognition was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Table 10 displays Pearson product-moment correlation results for study variables. Hypothesis one was supported. There was a moderately strong, positive correlation between negative valence of the drinking-related self-schema and problem recognition, $r = .49, n = 55, p < .01$, with a high degree of negativity within the drinking-related self-schema associated with higher levels of problem recognition. Likewise, hypothesis two was supported. There was a moderate, negative correlation between positive valence of the drinking-related self-schema and problem recognition, $r = -.40, n = 55, p < .01$, with a high degree of positivity within the drinking-related self-schema associated with lower levels of problem recognition.

Table 10

Pearson product-moment correlations for study variables

	Problem recognition	Taking steps	Ambivalence	Years of education	Drinks per drinking day	Drinking days per week	Age	Positive Valence	Negative Valence	Elaboration of recovery-related self-schema	Elaboration of drinking-related self-schema
Elaboration of drinking-related self-schema	0.25	-0.35**	0.17	-0.14	0.21	0.41**	-0.02	0.11	0.01	-0.35**	
Elaboration of recovery-related self-schema	0.16	0.65**	-0.02	0.13	-0.22	-0.45**	-0.10	-0.00	0.27*		
Negative Valence	0.49**	0.14	0.34*	-0.18	-0.04	-0.19	-0.02	-0.20			
Positive Valence	-0.40**	-0.06	-0.11	0.18	-0.14	0.14	0.25				
Age	0.00	0.01	0.13	0.12	-0.11	0.11					
Drinking days per week	-0.06	-0.56**	0.21	-0.32*	0.23						
Drinks per drinking day	0.01	-0.23	0.27*	-0.12							
Years of education	-0.14	0.26	-0.20								
Ambivalence	0.57**	0.10									
Taking steps	0.25										
Problem recognition											

Note. $N=55$. * $p < .05$ (two-tailed) ** $p < .01$ (two-tailed)

Determining the Ability of the Structural Properties of the Drinking-Related Self-Schema to Explain Problem Recognition (Aim 3)

Problem recognition. Aim three was designed to determine the ability of the structural properties of the drinking-related self-schema to explain problem recognition. Hypothesis three proposed that the valence and elaboration of the drinking-related self-schema would explain problem recognition. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Simultaneous multiple regression analysis was conducted to assess the ability of the study variables of elaboration and valence to explain problem recognition. Selected demographic (age and education level) and alcohol-related (frequency and quantity of drinking alcohol use) variables were entered into the equations because these variables may also influence problem recognition. The count of negatively valenced traits comprising the drinking-related self-schema, count of positively valenced traits comprising the drinking-related self-schema, elaboration scores for drinking-related and recovery-related self-schemas, age, level of education, and frequency and quantity of alcohol use were entered into the model simultaneously. The multiple regression results are displayed in Table 11. The total variance explained by the model was 37%, R^2 adjusted=0.37, $F(8,46)=4.99$, $p<.001$. Three study variables were significant in the model, negative valence ($beta= .36$, $p<.01$); positive valence ($beta= -.41$, $p<.001$); elaboration of the drinking-related self-schema ($beta= .38$, $p<.01$). The demographic and alcohol-related variables made no statistically significant contribution to the model. Thus, Hypothesis 3 was supported.

Table 11

Summary of multiple regression analysis for variables explaining problem recognition (N=55)

Variable	Problem recognition			
	<i>B</i>	<i>t</i>	<i>p</i>	95% CI
Constant		2.05	0.05*	[0.23, 28.17]
Elaboration of drinking-related self-schema	0.38	3.02	0.00*	[0.08, 0.42]
Elaboration of recovery-related self-schema	0.19	1.45	0.16	[-0.04, 0.26]
Negative Valence	0.36	2.98	0.01*	[0.05, 0.25]
Positive Valence	-0.41	-3.46	0.00*	[-0.32, -0.09]
Age	0.13	1.15	0.26	[-0.06, 0.22]
Drinking days per week	-0.00	-0.02	0.98	[-0.74, 0.72]
Drinks per drinking day	-0.063	-0.55	0.59	[-0.28, 0.16]
Years of education	0.00	0.02	0.98	[-8.4, 0.86]

Note. N=55. Overall $R^2=0.47$, Adjusted $R^2=0.37$, $F(8,46)=4.99$, $p<0.000$. CI= confidence interval. *significant

Exploratory Analyses

In order to inform future interventions research, additional analyses were performed to further understand the relationship between the structural properties of drinking and recovery-related self-schemas and Taking Steps and Ambivalence. The relationship was computed between the valence and elaboration of drinking and recovery-related self-schemas and the Taking Steps and Ambivalence SOCRATES-8 sub-scales.

Taking steps. The relationship between elaboration of the drinking-related self-schema and SOCRATES-8 Taking Steps scores were investigated using Pearson product-moment correlation coefficient. No violations of assumptions were found. There was a moderate, negative correlation between the two variables, $r= -.35$, $n=55$, $p<.01$, with availability of an elaborate drinking-related self-schema being associated with fewer actions toward recovery. In contrast, a strong, positive correlation was found between elaboration of a recovery-related self-schema and taking steps ($r= .65$, $n=55$, $p<.01$), with availability of an elaborate a

recovery-related self-schema associated with one initiating action to modify their drinking behavior. There was no significant correlation found between valence of the drinking-related self-schema and taking steps. The results of the correlational analyses are detailed in Table 10.

A simultaneous multiple regression analysis was performed in order to assess the ability of elaboration and valence of the drinking-related self-schema, age, level of education, and frequency and quantity of alcohol use to explain taking steps. Preliminary analyses ensured no violation of assumptions. Elaboration scores for drinking and recovery-related self-schemas, the count of negatively valenced traits comprising the drinking-related self-schema, the count of positively valenced traits comprising the drinking-related self-schema, age, level of education, and frequency and quantity of drinking were entered into the model simultaneously. The multiple regression results are displayed in Table 12. The total variance explained by the model was 46%, R^2 adjusted=0.46, $F(8,46)=6.81$, $p<.001$. In the model, two variables were significant; availability of a recovery-related self-schema ($beta= .52$, $p<.001$) and frequency of drinking ($beta= -.30$, $p<.05$).

Table 12

Summary of multiple regression analysis for variables explaining taking steps (N=55)

Variable	Taking steps			
	<i>B</i>	<i>t</i>	<i>p</i>	95% CI
Constant		2.22	0.03*	[1.68, 34.14]
Elaboration of drinking-related self-schema	-0.02	-0.17	0.87	[-0.21, 0.18]
Elaboration of recovery-related self-schema	0.52	4.34	0.00*	[0.20, 0.55]
Negative Valence	-0.06	-0.50	0.62	[-0.15, 0.09]
Positive Valence	-0.07	-0.66	0.52	[-0.18, 0.09]
Age	0.09	0.89	0.38	[-1.83, -0.14]
Drinking days per week	-0.30	-2.34	0.02*	[-0.29, 0.21]
Drinks per drinking day	-0.04	-0.35	0.73	[-0.30, 0.21]
Years of education	0.09	0.77	0.44	[-0.61, 1.37]

Note. $N=55$. Overall $R^2=0.54$, Adjusted $R^2=0.46$, $F(8,46)=6.81$, $p<0.000$. CI= confidence interval. *significant

Ambivalence regarding whether drinking is problematic. The relationship between elaboration of the drinking-related and recovery-related self-schemas and SOCRATES-8 Ambivalence scores were investigated using Pearson product-moment correlation coefficient. No violations of assumptions were found. No statistically significant relationship was found between elaboration and ambivalence. The relationship between valence of the drinking-related self-schema and the SOCRATES-8 Ambivalence subscale scores were also investigated using Pearson product-moment correlation coefficient. A moderate, positive correlation was found between negative valence of the drinking-related self-schema and ambivalence, $r = .34$, $n = 55$, $p < .05$, with high degree of negativity associated with higher ambivalence or internal struggle regarding the need for treatment. Correlational analysis results are detailed in Table 10.

A simultaneous multiple regression analysis was performed in order to assess the ability of elaboration and valence of the drinking-related self-schema, age, level of education, frequency and quantity of alcohol use to explain ambivalence. Preliminary analyses ensured no violation of assumptions. Elaboration scores for drinking and recovery-related self-schemas, the count of negatively valenced traits comprising the drinking-related self-schema, and the count of positively valenced traits comprising the drinking-related self-schema, age, level of education, quantity and frequency of alcohol use, were entered into the model simultaneously. The multiple regression results are displayed in Table 13. The total variance explained by the model was 15%, R^2 adjusted = 0.15, $F(8,46) = 2.16$, $p < .05$. One variable was significant in the model; negative valence ($\beta = .34$, $p < .05$).

Table 13

Summary of multiple regression analysis for variables explaining ambivalence (N=55)

Variable	Ambivalence			
	<i>B</i>	<i>t</i>	<i>p</i>	95% CI
Constant		1.97	0.05*	[-0.19, 16.86]
Elaboration of drinking-related self-schema	0.07	0.47	0.64	[-0.08, 0.13]
Elaboration of recovery-related self-schema	0.08	0.51	0.62	[-0.07, 0.12]
Negative Valence	0.34	2.46	0.02*	[0.01, 0.14]
Positive Valence	-0.08	-0.55	0.58	[-0.18, 0.71]
Age	0.17	1.29	0.20	[-0.01, 0.25]
Drinking days per week	0.20	1.22	0.23	[-0.18, 0.71]
Drinks per drinking day	0.24	1.78	0.08	[-0.02, 0.25]
Years of education	-0.05	-0.37	0.72	[-0.62, 0.43]

Note. N=55. Overall $R^2=0.27$, Adjusted $R^2=0.15$, $F(8,46)=2.16$, $p<0.05$. CI= confidence interval. *significant

Relationship between the Structural Properties of Drinking and Recovery-Related Self-Schemas and Drinking Behavior

Additional analyses were conducted a posteriori to further explore the relationship between the structural properties of the drinking-related self-schema and drinking behavior. Based upon the results from the preceding analyses, it was anticipated that 1) availability of an elaborate drinking-related self-schema would be positively correlated with frequency and quantity of drinking, 2) availability of an elaborate recovery-related self-schema would be negatively correlated with frequency and quantity of drinking, and 3) availability, valence, and elaboration of the drinking-related self-schema would explain frequency and quantity of alcohol consumed.

Pearson product-moment correlation coefficient was used in order to examine the relationship between the structural properties of drinking and recovery-related self-schemas, and frequency of drinking behavior. Preliminary analyses were performed to ensure no violation of assumptions. A moderate, positive correlation was found between elaboration of the

drinking-related self-schema and number of drinking days per week ($r=.41$, $n=55$, $p<.01$), with higher degree of elaboration of the drinking-related self-schema being associated with more drinking days per week. In addition, a moderate, negative correlation was found between elaboration of a recovery-related self-schema and number of drinking days per week ($r=-.45$, $n=55$, $p<.01$), with a higher degree of elaboration of the recovery-related self-schema associated with fewer drinking days per week. No statistically significant relationship was found between availability of drinking and recovery-related self-schemas and number of drinks consumed per drinking day.

Multiple regression analysis was conducted in order to assess the ability of the study variables to explain frequency and quantity of alcohol use. Preliminary analyses ensured no violation of assumptions. Elaboration scores for drinking and recovery-related self-schemas, the count of negatively valenced traits comprising the drinking-related self-schema, and the count of positively valenced traits comprising the drinking-related self-schema, were entered into the model simultaneously. The multiple regression results are displayed in Table 14. The total variance explained by the model was 29%, $R^2=0.24$, R^2 adjusted=0.24, $F(4, 50)=5.17$, $p<.001$. In the model, two variables were significant: availability of a recovery-related self-schema ($beta= -.32$, $p<.05$), and availability of a drinking-related self-schema ($beta= .29$, $p<.05$). Despite explaining frequency of alcohol use, the model did not predict quantity of alcohol consumed, to a statistically significant degree ($F(6,48)=.91$, $p=.50$).

Table 14

Summary of multiple regression analysis for variables explaining frequency of alcohol use

(*N*=55)

Variable	Frequency of drinking			
	<i>B</i>	<i>t</i>	<i>p</i>	95% CI
Constant		3.24	0.00*	[1.56, 6.78]
Elaboration of drinking-related self-schema	0.29	2.29	0.03*	[0.01, 0.14]
Elaboration of recovery-related self-schema	-0.32	-2.41	0.02*	[-0.13, -0.012]
Negative Valence	-0.09	-0.68	0.50	[-0.06, 0.03]
Positive Valence	0.09	0.71	0.49	[-0.03, 0.06]

Note. *N*=55. Overall $R^2=0.29$, Adjusted $R^2=0.24$, $F(4,50)=5.17$, $p<0.001$. CI= confidence interval. *significant

Discussion

Drawing from the Self-Schema Model of Impaired Problem Recognition, it was posited that the structural properties of the drinking-related self-schema are associated with problem recognition and drinking behavior. It was hypothesized that valence and elaboration of the drinking-related self-schema would explain problem recognition in individuals with DSM-5 moderate to severe AUD. Results from this community sample supported the research hypotheses. In addition, findings provide initial evidence to suggest the drinking and recovery-related self-schemas may serve as effective targets for therapeutic intervention.

The first tenet of the SSM-IPR proposes that a positively valenced drinking-related self-schema results in poor problem recognition in part because it renders the inaccurate self-perception that drinking is non-problematic. Correspondingly, results determined that a positively valenced drinking-related self-schema was associated with low levels of problem recognition while a negatively valenced drinking-related self-schema was associated with high levels of problem recognition. In addition to lending support for the SSM-IPR, these support existing misattribution and positivity bias models of impaired problem recognition (e.g. Forchuck, 1986; Green, Lightfoot, Bandy, & Buchanan, 1985; Harvey & Weary, 1984; Kelley &

Michela, 1980; Logan, Henry, Vaughn, Luk, & King, 2012; Manousos & Williams, 1998; Maruna & Mann, 2006; McMahon & Jones, 1992; Pennock & Poudrier, 1978; Wing & Hammer-Higgins, 1993), by empirically establishing that the valence of the drinking-related information encoded within the self-concept explains the degree of problem recognition.

The second tenet of the SSM-IPR proposes that as the drinking-related self-schema elaborates, it increasingly supports drinking-behavior. As predicted, availability of an elaborate drinking-related self-schema explained frequency of alcohol use and was negatively correlated with taking steps toward recovery ($r=-0.35$).

The third tenet of the SSM-IPR proposes that the accumulation of negative drinking-related experiences causes the drinking-related self-schema to compartmentalize away from the remainder of the self-concept, further impairing problem recognition. Congruently, results revealed that the content of the drinking-related self-schema was significantly more negatively valenced than the content of the remaining overall self-concept. This difference in valence reveals a lack of redundancy in traits and attributes between the drinking-related self-schema and the remainder of the self-concept, lending support to the proposition that the drinking-related self-schema would not be reliably accessed to inform self-referential judgments. These findings are also congruent with existing cognitive dissonance models of impaired problem recognition (Forchuck, 1986; Pennock & Poudrier, 1978), and explain how, on a neurocognitive level, compartmentalization occurs and why it results in impaired problem recognition.

The fourth tenet of the SSM-IPR proposes that the drinking related self-schema can elaborate to the point that it becomes the most influential schema within the self-concept. As anticipated, it was determined that within this sample of individuals who had extensive

drinking-related experience (evidenced by moderate to severe AUD), a large portion of the self-concept was dedicated to the drinking-related self-schema (43%). Furthermore, elaboration of a negative drinking-related self-schema predicted increased problem recognition and ambivalence about one's drinking behavior. These findings are consistent with existing models of alcohol abuse that are grounded in the premise that over time alcohol assumes a central organizing role in the alcohol dependent person's life (Denzin, 1993; Brown, 1996).

Furthermore, the results explain how and why, on a neurocognitive level alcohol takes on a central role within one's life. In contrast to existing research (Nwakeze et al., 2002), results from this study failed to find any statistically significant relationship between the socio-demographic variables of age and level of education, and problem-recognition, ambivalence, or taking steps.

Beyond establishing that the structural properties of the drinking-related self-schema undergird impaired problem recognition and drinking behavior, findings from this study also lend significant guidance toward the development of future interventions for AUD. Results revealed that not only does a drinking-related self-schema undergird impaired problem recognition and drinking behavior, but also that among some individuals an independent recovery-related self-schema may exist simultaneously. The predominantly negatively valenced content of the drinking-related self-schema and predominantly positively valenced content of the recovery-related self-schema suggest that the drinking and recovery-related self-schemas are two separate, dedicated neurological networks. Furthermore, regression analysis revealed that both availability of a drinking-related self-schema and availability of a recovery-related self-schema contributed differently to explaining frequency of drinking. These findings suggest that one's drinking-related self-schema likely does not restructure and transition over time toward a

recovery-related self-schema, rather it is overshadowed by the elaboration of a completely new and discrete recovery-related self-schema.

The preceding revelation, in combination with further findings from this study provide significant guidance in directing future schema-based interventions. Findings from this study revealed a strong correlation ($r=.65$) between availability of a recovery-related self-schema and taking steps toward modifying one's drinking behavior, and a moderate, negative correlation ($r=-.45$) between availability of a recovery-related self-schema and frequency of drinking. These findings suggest that interventions focused on increasing elaboration of the recovery-related self-schema may assist individuals in taking steps toward seeking treatment and in decreasing drinking frequency. Furthermore, the Self-Schema Model of the Self-Concept dictates that the less frequently a self-schema is accessed, the less elaborate, and thus influential, it becomes (Stein & Corte, 2007). Therefore, as a recovery-related self-schema elaborates, it is likely the drinking-related self-schema will decrease in elaboration and influence. Since results revealed that an elaborate drinking-related self-schema was negatively correlated with taking steps ($r=-0.35$), and positively correlated with frequency of drinking ($r=0.41$), decreasing elaboration of the drinking-related self-schema should improve taking steps toward recovery. However, given the cross-sectional nature of the data, future longitudinal studies should be conducted to determine changes in the relationship between elaboration of drinking and recovery-related self-schemas, and taking steps across time.

Although the recovery-related self-schema composed only 3% of the self-concept, within this sample comprised predominantly of active drinkers, establishing its availability and empirically determining elaboration is a noteworthy finding. To our knowledge this study is the first to quantify the elaboration of a recovery-related self-schema and provide a means to

measure the proportion of the self-concept that is comprised of the drinking and recovery-related self-schemas. It would be beneficial for future interventions research to use similar methodology to track the effect of schema-based interventions.

Limitations

Limitations of this study included the relatively small sample size, composed predominantly of men. In addition, findings are limited due to the cross-sectional correlational design. Due to the correlational design the relationship between the structural properties of the drinking-related self-schema and problem recognition can only be inferred based upon theoretical underpinnings. Findings would be strengthened with additional studies using a larger sample size and longitudinal design to evaluate change over time and predictors of problem recognition that may serve as intervention targets.

Conclusion

This study found that the availability, valence and elaboration of the drinking-related self-schema undergirded impaired problem recognition and drinking behavior within a sample of men and women experiencing DSM-5 moderate to severe alcohol use disorder. Furthermore, availability of a recovery-related self-schema that guided recovery and decreased drinking and/or abstinence was found within the sample. Findings lend empirical support for the Self-Schema Model of Impaired Problem Recognition and provide guidance for the formation of novel and greatly needed theoretically and empirically grounded, cognitively based interventions addressing alcohol use disorder.

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Appendix A

Table 15

Study measures, administration time and order, reliability and validity statistics

Admin Order	Measure	Purpose	Concept	Level of Measurement	Validity and Reliability	Admin Time
1	Alcohol Breathalyzer	Screening Variable	Establish ability to provide informed consent Blood alcohol level must be $\leq .05$	Ratio	Sensitivity $\pm 0.01\%$ @ 0.10% BAC	< 1 min
2	CAGE Questionnaire	Screening Variable	Establish likelihood of meeting DSM-5 Criteria	Ratio		<1 min
3	Informed Consent					5 min
4	Mini Mental State Examination-2 (MMSE-2)	Screening Variable	Establish cognitive competency and ability to provide consent A score of <23 indicates cognitive impairment	Ordinal		10 min
5	Self-Schema Card Sort Task	Study Variable	-Spontaneous generation of drinker schema/availability -Elaboration of schema (redundancy of attributes across overall self-concept) -Determine structural properties of schemas (attributes and valence)	Nominal/Categorical (yes/no) Ratio Nominal, Categorical	Test re-test $r=.7$ (Linville, 1987; Rafaeli-Mor et al., 1999) Split-half reliability <i>dimensionality</i> ($r=.95-.97$, $p<0.001$) <i># of self-aspects</i> ($r=.82-.86$, $p<0.001$) <i>Overlap in self-aspects</i>	40 min

					($r=.74-.78$, $p<0.001$) (Rafaeli-Mor et al., 1999)	
					Test re-test over 18mths $R(34)=.49$, $p<.01$ (Corte & Stein, 2007; Stein, 1995)	
6	Closed-ended schema task	Study Variable	-Availability & nature of drinker schema -Confirm validity of schema-measures in sample	Nominal/Categorical	Cronbach alpha for drinker schema=.93 (Corte & Stein, 2007)	<3 min
					Cronbach alpha for recovery schema=.95 (Corte & Stein, 2007)	
					Test re-test reliability at 2 weeks <i>fat self</i> ($r=.82$, $p<.001$) (Stein & Hedger, 1997)	
					Test re-test reliability at 2 weeks <i>deviant</i> ($r=.79$, $p<.001$) <i>conventional</i> ($r=.83$, $p<.001$) <i>popular</i> ($r=.87$, $p<.001$) (Stein, Roeser, & Markus, 1998)	
7	Stages of	Study	Determine level of problem	Nominal/Categorical,	Cronbach alpha	< 3

	Change Readiness and Treatment Eagerness Scale (SOCRATES-8)	Variable	recognition	Ordinal	<i>Ambivalence</i> = .6-.88 <i>Recognition</i> = .85-.95 <i>Taking steps</i> = .83-.96 Test-retest reliability <i>Ambivalence</i> r=.83 <i>Recognition</i> r=.94 <i>Taking steps</i> r=.93 (Miller & Tonigan, 1996)	min
8	Timeline Follow-back: Alcohol	Study Variable	Determine quantity and frequency of alcohol use over 90 days Duration of Alcohol Use (years)	Ratio Interval		10-15 min
9	DSM-5 Alcohol Use Questionnaire	Screening Variable	Determine AUD diagnosis of moderate to severe	Nominal/Categorical, Ordinal		5 min
10	DAST-10	Screening Variable	Screening for likelihood of co-occurring substance use disorder	Nominal/Categorical, Ordinal		<3 min
11	Demographics	Screening and Demographics Variables	Demographics -Gender -Age -Level of Education -Socioeconomic Status -Race/Ethnicity	Categorical Ratio Ratio Interval Categorical		<3 min
					Total Administration Time	88 min

CHAPTER FIVE
SUMMARY, IMPLICATIONS AND RECOMMENDATIONS FOR FUTURE
RESEARCH

Summary

Alcohol use disorder (AUD) continues to be a significant public health challenge despite the availability of numerous treatment options. Impaired problem recognition has been identified as a critical factor negatively impacting treatment-seeking and intervention outcomes. However, the cognitive processes that result in impaired problem recognition remain poorly understood. Once the cognitive mechanisms undergirding impaired problem recognition are identified, effective interventions addressing impaired problem recognition and AUD can be developed.

The Self-Schema Model of the Self-Concept identifies the structural and functional properties of the self-concept that guide self-perception and behavior. Grounded within the Self-Schema Model of the Self-Concept, the overall purpose of this dissertation was to identify the neurocognitive structures that undergird impaired problem recognition, in order to lay the foundation for the future development of neurocognitive interventions focused on improving impaired problem recognition within AUD.

The first manuscript of this three paper dissertation (Chapter Two) consisted of an integrative literature review, conducted to synthesize the existing research concerning

self-schemas within AUD. The following research questions guided the review: 1) what is known about the availability, structure and effect of the drinking-related self-schema among individuals with an AUD; and 2) how are drinking-related self-schemas operationalized within the health and psychosocial literature. In this review, it was determined that there is a very small body of fair-to-good quality literature available on the topic of self-schemas within alcohol using samples. The available literature suggests that the degree of elaboration of the drinking-related self-schema is a key structural property influencing drinking-related behavior, however the content and valence of drinking-related self-schemas remain relatively unexplored. This manuscript contributes to the nursing science and addictions literature by identifying the state of the knowledge pertaining to self-schemas in AUD and synthesizing what is currently known regarding the structural properties and effects of drinking-related self-schemas.

In the second manuscript (Chapter Three), a model is proposed based on theoretical and empirical literature about the structural properties of the drinking-related self-schema. The report reviews the Self-Schema Model of the Self-Concept in-depth, and then proposes the Self-Schema Model of Impaired Problem Recognition within alcohol use disorder, grounded within both the self-schema and addictions literature. This manuscript adds to the nursing science and addictions literature by being the first schema-based model to my knowledge, to explain the complex cognitive processes the result in impaired problem recognition and behavior within AUD on a neurocognitive level. The model is the first to propose the structural properties of the drinking-related self-schema within individuals experiencing impaired problem recognition, and to identify how therapeutic interventions can influence the self-concept at the schema level in order to assist with recovery from AUD.

The third manuscript (Chapter Four) details a cross-sectional correlational study conducted with the purposes of identifying the structural properties of the drinking-related self-schema and determining the relationship between the structural properties of the drinking-related self-schema and problem recognition. Hypotheses tested by the study were generated using the Self-Schema Model of Impaired Problem Recognition. This study adds to the nursing and addictions science by being the first, to the best of my knowledge to 1) identify the structural properties (availability, valence and elaboration) of the drinking-related self-schema; 2) to identify the relationship between the structural properties of the drinking-related self-schema and problem recognition, taking steps toward modifying drinking behavior, ambivalence about problematic drinking, and drinking behavior, and 3) to identify the relationship between the structural properties of a recovery-related self-schema and drinking and recovery-related behavior. In addition, this study provided empirical support for the Self-Schema Model of Impaired Problem Recognition.

Contribution of the Dissertation as a Whole, to Nursing Science

As detailed in the integrative review presented in Chapter Two, much remains unknown regarding the neurocognitive processes undergirding impaired problem recognition in AUD. Currently there are several models of impaired problem recognition- misattribution models, positivity bias based models, and cognitive dissonance models. All of the available models propose that cognitive phenomenon result in impaired problem recognition, however none explain how on a neurocognitive level these processes occur, merely that they do.

Drawing from the Self-Schema Model of the Self Concept and addictions literature, the Self-Schema Model of Impaired Problem Recognition was proposed in order to explain how neurocognitive structures influence problem recognition. Through using this model it was

possible to explain for the first time how, on a neurocognitive level, misattribution, positivity bias and cognitive dissonance occur, and why they result in impaired problem recognition. It was proposed that individuals experiencing an AUD with low problem recognition possess a drinking-related self-schema that is positively valenced, rendering the inaccurate perception that one's drinking is non-problematic. It is proposed that the positive valence results from misattribution of negatively valenced drinking-related information while positively valenced information is more readily incorporated into the drinking-related self-schema. In addition, it is proposed that with continued experience within the domain of drinking the drinking-related self-schema elaborates, driving drinking behavior. As one continues to drink problematically, he or she accumulates negative drinking-related experiences, causing the content of the drinking-related self-schema to shift in valence from positive to negative and become compartmentalized. Compartmentalization results from a lack of redundancy between traits and attributes composing the drinking-related self-schema and those composing the remainder of the self-concept. Compartmentalization results in impaired problem recognition because it causes the drinking-related self-schema to become infrequently accessed in relation to the remainder of the self-concept. However, it is also posited that, ultimately, as experiences accumulate the drinking-related self-schema can become the most elaborate and as such predominant schema, overshadowing the remaining self. This elaboration with negatively valenced content results in increased problem recognition.

In sum, through identifying first that drinking-related self-schemas exist, second by identifying their structural properties (valence and elaboration), and third by empirically establishing the relationship between the structural properties of the drinking-related self-schema and problem recognition, it was for the first time to explained on a neurocognitive level, why

impaired problem recognition occurs. Furthermore, this research explains how alcohol use can become a patterned non-conscious behavior, and how alcohol can take on a central organizing role in one's life (as proposed within multiple alcohol use models). Thus, this dissertation adds not only to what is known regarding the structural properties of the drinking-related self-schema, but both unites and explains the cognitive processes undergirding misattribution, positivity bias, cognitive dissonance, and models of alcohol abuse.

Furthermore, it was found that not only does a drinking-related self-schema exist and undergird impaired problem recognition and drinking behavior, but also that among some individuals an independent recovery-related self-schema may exist simultaneously. The predominantly negatively valenced content of the drinking-related self-schema and predominantly positively valenced content of the recovery-related self-schema reveal that the drinking and recovery-related self-schemas are two separate, dedicated neurological networks. Therefore, to the best of my knowledge this dissertation provides the first evidence regarding how the self-concept changes in relation to recovery. One's drinking-related self-schema likely does not restructure and transition over time toward a recovery-related self-schema, rather it is overshadowed by the elaboration of a completely new and discrete recovery-related self-schema.

Recommendations for Further Research

The preceding research represents the first steps in a promising line of research identifying and understanding the neurocognitive structures and processes undergirding drinking and recovery-related self-perceptions and behavior within AUD. Although the findings contained within this dissertation are intriguing, they are also limited. Findings would be strengthened by conducting a second longitudinal study using a larger sample size, in order to 1) confirm the results presented in Chapter Four, and 2) to identify the relationship between

changes in the structural properties of the drinking-related self-schema, and problem recognition, drinking behavior, and recovery over time.

Additionally, the National Institute on Alcohol Abuse and Alcoholism's (NIAAA) Five Year Strategic Plan outlines several critical research priorities that can be addressed using a self-schema model. The NIAAA's most recent release of research priorities calls on researchers to discover life stage-appropriate strategies for identifying, treating, and preventing AUD (National Institute on Alcohol Abuse and Alcoholism, 2009). In particular the NIAAA identifies the need for research identifying how the emergence and progression of drinking behavior is influenced by changes in biology, psychology, and in exposure to social and environmental inputs over a person's lifetime. The self-schema model is ideally positioned to address these needs because it has biological, psychological, social and environmental underpinnings. As was detailed in Chapter Three of this dissertation, self-schemas consist of dedicated self-referential neurological networks (biological), formed over time through social and environmental experiences (social and environmental), which guide the processing and interpretation of self-referential information (psychological).

Within the list of research priorities, the NIAAA discusses the need for better understanding regarding the influence of family history of alcoholism on early initiation of alcohol use and onset of AUD. Since self-schemas are established over time with experience within the domain, being raised within a home in which a parent is experiencing an AUD may result in early elaboration of a drinking-related schema, as the child begins to encounter and assimilate information about drinking and drinking behavior. It would be beneficial to conduct a longitudinal study exploring whether children of parents with an AUD display early availability of a drinking-related schema, and to determine if early availability is related to future

problematic drinking-related behavior and AUD. It is possible that this schema provides the foundational structure which further elaborates into a drinking-related self-schema as the child or teen begins to consume alcohol him or herself.

Furthermore, the NIAAA report notes, “brain development, marked by continuous generation of neurons and connections between neurons, and the refinement of communication among those neurons, continues during puberty and into the young adult ages. Drinking alcohol during this dynamic period of brain development may result in brain effects leading to an earlier onset of alcohol-induced specific diseases or to an earlier transition towards the development of alcohol use disorder” (National Institute on Alcohol Abuse and Alcoholism, 2009, p. 11). In order address this phenomenon, NIAAA calls for research that identifies alcohol behavioral markers for problem alcohol use by youth, especially for very early markers of risky drinking. A second promising direction for future research would be to conduct a longitudinal study examining the availability, elaboration and valence of the drinking-related self-schema among high school students, to determine if the structural properties were able to predict problematic drinking in early and middle adulthood. If such a relationship were supported, then individuals at risk for AUD could be identified before problematic drinking behavior becomes established. Furthermore, schema-based interventions could be utilized early to reduce further elaboration of the drinking-related self-schema.

Finally, the NIAAA identifies the need for research to “identify biological factors and contextual social factors that contribute to the decisional process to change drinking behavior as part of the transitional process from alcohol dependence to recovery, and the factors underlying sustained recovery among those individuals who succeed in both the presence and absence of professional treatment” (National Institute on Alcohol Abuse and Alcoholism, 2009, p. 16). The

Self-Schema Model of Impaired Problem Recognition resolutely addresses this call for research. The Self-Schema Model of Impaired Problem Recognition is founded on the premise that the structural properties of the self-concept are critical to creating and resolving impaired problem recognition within AUD. It is posited that the structural properties of the drinking-related self-schema (availability, elaboration and valence) are of particular influence. Grounded within self-schema theory, the model details how contextual social factors shape neurological structures and functioning, subsequently impacting decisional processes and behavior within the domain of drinking. As detailed in Chapter Four, the dissertation study found that the structural properties of the drinking-related self-schema explained problem recognition (R^2 adjusted=0.37, $F(8,46)=4.99$, $p<.001$), taking steps toward modifying drinking (R^2 adjusted=0.46, $F(8,46)=6.81$, $p<.001$), and ambivalence regarding whether one's drinking is becoming problematic (R^2 adjusted=0.15, $F(8,46)=2.16$, $p<.05$). These results identify the neurocognitive factors contributing to the decisional process to change drinking behavior. Furthermore, the study found that availability of a recovery-related self-schema was positively correlated with taking steps ($r=.65$, $n=55$, $p<.01$), and negatively correlated with drinking behavior (number of drinking days per week) ($r=-.45$, $n=55$, $p<.01$). These results suggest that a recovery-related self-schema likely underlies sustained recovery. Correspondingly, another promising direction for future research would be to conduct a longitudinal schema-based interventions study, similar to those proposed by Avants and Margolin (2004), Shadel, Mermelstein, and Borrelli (1996), and Stein, Corte, and Ronis (2010). Such a study would be focused on increasing the elaboration of a recovery-related self-schema and decreasing elaboration of the drinking-related self-schema in order to promote the transition from an AUD to recovery, and to promote sustained recovery among individuals experiencing an alcohol use disorder. Addressing NIAAA's call for researchers to apply new

technologies to understand how acute as well as chronic alcohol use affects neural circuits and how neural circuits are modified by treatment and recovery, this schema-based interventions study could incorporate the use of biomarkers such as functional magnetic resonance imaging (fMRI) to examine how brain regions associated with processing schematic information change with intervention.

In conclusion, AUD is associated with substantial, negative health, social and economic consequences. Impaired problem recognition is a primary barrier to treatment seeking and successful recovery from alcohol use disorder. The research presented within this dissertation adds to the nursing and addictions literature by being the first body of work to identify the neurocognitive structures that undergird impaired problem recognition within AUD, and provides needed direction for the development of effective interventions addressing impaired problem recognition within alcohol use disorder. This dissertation represents the foundational steps in the development of a much needed, cutting edge program of neurocognitive addictions and interventions research.

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