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What Facilitates Client Motivation for Change?

A critical look at self-determined behavior change

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What Facilitates Client Motivation for Change? Social Cognitive Theories and Cognitive Neuroscience on Facilitating Behavior Change In-Session

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I hereby certify that all material in this final year project which is not my own work has been identified and that no work is included for which a degree has already been conferred on me.

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Abstract

Motivational Interviewing (MI) is a client-centered, directive approach for behavior change. Self-Determination Theory (SDT) is a theory of human motivation and self-determined growth. Both of these social-cognitive theories aim to explain motivation and health behavior change and have generated a lot of research on how to increase human motivation. However, MI lacks a definite theory on mechanisms of behavior change and SDT offers a theory of motivation based on extensive research on human interactions. This paper aims to critically look at facilitators of client motivation for behavior change in-session from a social-cognitive perspective on one hand, and neural correlates related to client behavior change on the other hand. MI and SDT somewhat similarly explain what most importantly determines client motivation for change in-session. However, SDT mainly focus on psychological needs such as fostering client autonomy, and MI focus on the therapeutic alliance and on generating client change talk in-session. Efforts to bridge the two methods aim at generating a clearer definition of motivation in MI, and a better framework of practice in SDT. Studies on neural correlates of behavior change support and challenge elements of both approaches, indicating the importance of autonomy and relatedness for motivating positive behavior change.

Keywords: motivational interviewing, self-determination theory, therapeutic alliance, intrinsic motivation, in-session, change talk, autonomy, neural correlates

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Introduction

"There is simply no change without movement and no movement without motivation" (Ryan, Lynch, Vansteenkiste & Deci, 2010, p. 199).

The word motivation derives from the Latin word movere, "to move" or "be moved" and implies, more technically, both the energy and direction of action (Ryan et al., 2010). Motivation can be conceptualized as selecting goals based on their predicted value, initiating behavior to achieve goals and maintaining goal-directed action (Spielberg, Miller, Engels, Herrington, Sutton, Banich & Heller, 2010).

Models used in psychotherapy and counseling directly or indirectly use motivational strategies to enhance treatment, but place different emphasis on the role of motivation in-session and to what extent the client "owns" their motivation, i.e. if motivation is seen as residing exclusively within the client or being the result of the behavior of both the counselor and the client in session (Ryan et al., 2010). Health behavior models rooted in the humanistic tradition of psychology generally view the client as an active and inherently motivated agent; "human nature is inherently trustworthy, growth-oriented and guided by choice" (Ryan et al., 2010, p. 226). Thus, these models place a strong emphasis on eliciting intrinsic motivation and volitional behavior from the client in the process of behavior change. Two such models are Motivational Interviewing and Self-Determination Theory. Markland, Ryan, Tobin and Rollnick (2005) explain intrinsic motivation as change arising from within the person, while extrinsic motivation to change is imposed by others.

Other models of health behavior discard the notion of intention alone leading to behavior change. Instead, they emphasize different stages or factors leading to behavior change; intention being just one of them. Further, a division is made between continuum models emphasizing the continuity of behavior change, and stages models, dividing behavior

change into different stages (Schwarzer, 2008). Emerging evidence also suggest that non-conscious processes are significant not only in behavior in general but goal-directed behavior as well (Aarts, 2007; Vallerand, Pelletier & Koestner, 2008). Further, client activities outside of treatment can significantly impact treatment outcome. An example of this is clients' natural tendency for self-generated healing such as the self-righting tendency (a.k.a. *the righting reflex*), where individuals exhibit a tendency to "righten" their behavior when maladaptive behaviors or adverse circumstances impair their functioning (Faris, Cavell, Fishburne & Britton, 2009).

Despite the theoretical controversies concerning motivation in health behavior change-theory and its role in behavior change, intentional motivation is nevertheless essential in having clients engage in psychotherapy and counseling in the first place and to work towards initiating and maintaining a behavior change (Levesque, Copeland & Sutcliffe, 2008; Ryan et al., 2010). With this follows that clients come to session for a wide variety of reasons, some of these externally motivated and others more motivated by internal contingencies. Of concern to therapy outcome is to initiate and maintain client intrinsic motivation for behavior change (Miller & Rollnick, 2002; Ryan & Deci, 2008; Ryan et al., 2010). The term 'in-session' in this paper is used as an interchangeable word for both counseling and psychotherapy as motivational strategies are used in a wide number of settings; in briefer health promoting sessions with non-pathological clients, as well as in longer therapeutic sessions with diagnosed clients with pathology.

The connection between neuroscience and psychotherapy/counseling has been increasingly covered in the literature in recent years (Linden, 2006; Ivey, 2011; Roffman, Marci, Glick, Dougherty & Rauch, 2005). Examining potentially critical neurobiological mechanisms in psychotherapy offer many possibilities such as greater efficiency of interventions, improvement in client diagnosis and aid in developing new treatment protocols

(Fonagy, 2004; Linden, 2008). Further, interventions based on talk-therapy have not been investigated on common grounds with medical interventions for similar diagnostic criteria (Roffman et al., 2008). Discoveries of neurogenesis and neuroplasticity in the brain may also play an important part in understanding mechanisms of effective counseling (Ivey, Ivey & Zalaquett, 2010). Thus, it is of interest and importance to critically look at self-determined behavior change from different scientific angles, considering the importance of client motivation in the process of behavior change in-session and the possibilities offered by combining neuroscience and psychotherapy/counseling.

The purpose of this essay is to look at the mechanisms that facilitate client motivation for behavior change in-session focusing mainly on two well-established methods of motivation and behavior change; Self-Determination Theory (SDT) and Motivational Interviewing (MI). Further, a review of the current literature on neural correlates related to client motivation and in-session behaviors is presented. The idea is to put theories of social cognition into perspective and to critically look at mechanisms of client motivation and behavior change from a neuroscientific perspective. Do evidence from social cognitive theories and neuroscience converge, and if so, to what extent do they converge?

The main reason for looking at SDT and MI is the explicit focus on explaining the concept of motivation in SDT and the practical framework to establish client motivation for behavior change in-session, put forward in MI. Further, both models have been empirically validated in a wide variety of settings (Markland et al., 2005; Vansteenkiste & Sheldon, 2006). Other models could have been chosen for the purpose of this essay, but these two were chosen partly since it is difficult to compare the efficiency of any health behavior change model over another in specific areas due to lack of good evidence (Noar & Zimmerman, 2005; Weinstein, 2007) and because the two theories seems to complement each other in furthering the understanding of client motivation in-session (Markland et al., 2005; Ryan &

Deci, 2008; Ryan et al., 2010; Vansteenkiste & Sheldon, 2006).

First, the theoretical background of health behavior models and neural studies related to client in-session behavior will be described. Second is a look at MI-methodology and SDT-theory as well as current research on facilitators of client motivation in these methods. Third, neural correlates related to client motivation and in-session behaviors are presented. Finally is a discussion of central themes and interesting findings.

Theoretical Background

Different schools of counseling such as behavioral and psychodynamic approaches and cognitive, existential and humanistic perspectives have a more or less explicit focus on client motivation for change in-session through the beliefs, interpersonal strategies and practices they embrace (Ryan et al. 2010). Some of these have an interest in explicitly define ideas about what the clients should do and aim for, referred to as outcome-oriented therapies by Ryan et al. (2010). Other models are more interested in exploration and search in an open-ended manner, instead referred to as process-oriented models. Inherent in this division of therapeutic models is also a more or less implicit focus on therapist vs. client-centered goals (Ryan el al., 2010). Many modern applications of these schools of counseling are eclectic, i.e. they integrate aspects from numerous approaches in practice. However, in contrast to external and behavior oriented schools of counseling, cognitive and humanistic schools tend to put a larger focus on client-centered goals and are thus more interested in facilitating client motivation for change in-session (Ryan et al., 2010).

Health behavior theories have a common aim to “explain how and why individuals refrain from risk behaviours and adopt health behaviours” (Krutulyte, Grunert, Scholderer, Hagemann, Elgaard, Nielsen & Graverholt, 2008, p. 138). A few examples of these theories are the Health Belief Model, Theory of Planned Behavior, Transtheoretical Model/Stages of

Change, Self-Determination Theory, Motivational Interviewing and the Health Action Process Approach (HAPA). A major distinction between theories is that between continuum/intention and stage/intervention models (Krutulyte el al., 2008, Schwarzer, 2008). Schwarzer (2008) argue that continuum models are limited by not discriminating between intention and behavior, instead assuming that a person's behavior is the outcome of a conscious intention. This view tries to move the individual along a continuum towards action. Thus, some factors that might affect outcome are ignored, such as emotional resistance, unforeseen barriers, temptation and time delay between decision making and action initiation (Krutulyte et al., 2008; Schwarzer, 2008).

Instead, Krutulyte et al. (2008) refers to previous research indicating that stage/intervention models might be more appropriate to avoid the abovementioned factors, and to decrease the intention-behavior gap. Stage models imply that different interventions are appropriate at different stages of behavior change, such as the initiation, maintenance, recovery and disengagement phases in HAPA. However, stage models have also been criticized for not being genuinely qualitative stages but rather subdivisions of a continuous process, or that they do not predict success in behavior change - to name a few issues (Schwarzer, 2008).

Social cognitive theories focus on the intentional aspects of behavior change assuming that an individual's intention to change is the best direct predictor of actual change (Schwarzer, 2008). Some of the problems with health behavior models and social cognitive theories are the lack of a proper common theoretical framework and their use of studies based on correlation as evidence for effectiveness, lacking a proper experimental setup to infer causality (Thirlaway & Upton, 2009; Vallerand, Pelletier & Koestner, 2008; Weinstein, 2007). Thus, most studies that assess the effectiveness of health behavior models are based on correlation or otherwise non-causal designs and are limited in their predictive value.

However, some have tried to bridge these problems, offering new theoretical frameworks or solutions to solve these issues (Noar & Mehrotra, 2010; Noar & Zimmerman, 2005; Weinstein, 2007).

Of special interest to social behaviors in-session is the growing field of social cognitive neuroscience (Lieberman, 2010), linking neuroscience with social cognition to get insight into "how the brain supports our ability to know ourselves, to know other people, and to make decisions about our social worlds" (Gazzaniga, Ivry & Mangun, 2008, p. 631). Research on neural correlates of motivation generally makes a distinction between motivation and executive functions; which both are considered necessary to complete goal-directed activities (Spielberg et al., 2010). Further, a distinction is made between approach and avoidance systems of motivation, and trait or state motivation with subsequent subcategories. These processes have been associated with different brain areas in the literature (Spielberg et al., 2010).

In summary; the cognitive- and humanistic tradition of psychology has spurred treatment models that focus on facilitating client motivation for behavior change. However, in general these models lack the proper scientific credibility of experimental research settings. To further understand the mechanisms facilitating client motivation for behavior change, current models could benefit from being examined in a larger context looking at commonalities of methodology in theories, creating new theoretical frameworks for research and comparing results with evidence from cognitive neuroscience. Next is a look at two social-cognitive theories on client motivation and behavior change to build an understanding of the issue from this well-studied field.

Motivational Interviewing (MI)

The spirit of MI is built on a collaborative partnership that honors the client's

perspective and expertise. It is further built on evoking intrinsic motivation for change from presumed resources within the client, and on affirming client's right to autonomy and self-direction (Miller & Rollnick, 2002). MI evolved during the early 1980s when founder Roger Miller was advised to write down his theories on addiction related treatment, which at the time differed from most conventional therapies for addiction who were based on confronting the client to change rather than examining clients own reasons to change (Miller & Rose, 2009). Gaining recognition around the same time, MI has repeatedly been associated with the stages of change concept in the trans-theoretical model and specifically the pre-contemplation and contemplation stages, were client awareness of problem and motivation for change is explored (Miller & Rollnick, 2009). However, Miller & Rollnick (2009) argue that although the trans-theoretical model, which suggests that people move between different stages of readiness for change, and MI bare resemblance they are not connected as MI was developed as an instrument for exploring ambivalence and motivational change and just happened to be the only model around at the time to fit into the terminology of the trans-theoretical model.

Instead, Miller & Rose (2009) gives credit to Festinger's formulation of cognitive dissonance (1957) and Bem's self-perception theory (1972) as main influences for MI techniques when exploring ambivalence and supporting change talk; as well as Rogers' client-centered approach of humanistic psychology (1959) when fostering the MI-spirit of in-session partnership between client and counselor. The reasoning behind Festinger and Bem's theories is that clients, in need of change, often are ambivalent about change and need to verbalize their own reasons for making a change in order to develop enough discrepancy to resolve ambivalence. A counselor advocating for change thus risk eliciting the other side of the argument from the ambivalent client, which is preferably avoided since people tend to get committed to arguments they defend verbally (Hettema, Steele & Miller, 2005).

Similarly to other social-cognitive models, MI puts effort on intentional motivation for

change although influence from self-perception theory suggests that change might also arise unknowingly when making conclusions from observing one's own largely unintentional behavior (Thirlaway & Upton, 2009). Thus, hearing one argue for change in-session might increase commitment and intentional motivation to change; which is targeted during MI-sessions.

Many studies now support the efficiency of MI and Adaptations of MI (AMI) in clinical settings, especially for addiction-related treatment in general and alcoholism in particular (Apodaca & Longabaugh, 2009; Markland et al., 2005; Miller & Rose, 2009). But there is currently no generally accepted and well defined theory on why MI might lead to change in motivation and what specific mechanisms are involved in generating such change in-session. This is also of concern to the authors of the original manuscript (Miller & Rollnick, 2002). Consequently, a growing interest in the mechanisms of change in recent years, in the wake of its supported efficiency in an increasing number of health related areas, have generated more articles examining what is really going on behind the curtains. However, results from using MI in-session are ambiguous in some cases, and using MI could possibly be negative and harmful in other cases (Miller & Rollnick, 2009). For example, in some circumstances where client motivation is already high at the onset of counseling, MI potentially slows down progress, when instead the client is ready for action-oriented treatment. Some studies also suggest that MI and other social cognition models only explain at best fifty percent of the variation in behavior (Thirlaway & Upton, 2009). Hence, other factors influencing behavior change such as habits, heuristic shortcuts, emotive and instinctual processes are usually not accounted for.

Nevertheless, the four general principles of MI (Miller & Rollnick, 2002) will be used as a reference-point when looking at mechanisms of change ahead, in order to simplify and categorize findings for comparison with SDT and neural evidence.

Four General Principles of MI

MI rests on four general principles, which all are fundamental parts of the so called MI-spirit and thus central in learning and practicing MI in a proper way in accordance with the original work of Miller & Rollnick (2002).

The first principle; *expressing empathy*, is based on the idea that accepting people as they are facilitates change. Skillful reflective listening - knowing what to pick up and reflect back to the client – is seen as a fundamental skill to create a good in-session partnership and genuine understanding of client issue. Also, ambivalence is considered completely normal within the MI-framework and is not diagnosed or otherwise questioned as an unwanted reaction during session. It is rather explored and used as a tool to enhance understanding of client possibilities.

The second principle; *developing discrepancy*, is a mark of the directive approach used within MI-sessions. It is based on the idea that the client rather than the counselor should present the arguments for change. The logic behind this is the finding that people are often persuaded by what they hear themselves say rather than by what other people tell them (Miller & Rollnick, 2002). Based on the assumption that client ambivalence is something to expect, the counselor avoids taking sides which would presumably force the client to voice the other side. Thus, change is motivated by having the client argument for and developing discrepancy between present behavior and important personal goals or values (Miller & Rollnick, 2002).

The third principle; *rolling with resistance*, is avoiding arguing for change with the client based on the "opposite sides- effect" mentioned earlier. Instead, resistance is not directly opposed, but rather new perspectives are invited and explored since the client is a primary resource in finding answers and solutions. Resistance is further seen as a signal to the counselor to respond differently which is based on the idea that resistance is not a

problem of the client but rather a problem of the relationship between counselor and client (Miller & Rollnick, 2002).

The fourth and final principle; *supporting self-efficacy*, is based on the idea that a person's belief in the possibility of change is an important motivator. Client self-efficacy and autonomy is fostered by having the client argument for change and solutions while counselors belief in client ability to change is important and becomes a self-fulfilling prophecy (Miller & Rollnick, 2002). Thus, the client is by support of the counselor considered an autonomous agent responsible for choosing and carrying out change.

Relational and Technical Aspects

Miller & Rose (2009) makes a distinction between technical and relational aspects to explain the mechanisms of behavior change in MI, but argue that both of them are necessary to influence treatment outcome. Relational aspects refer to the client-counselor relationship and factors that maintain a good working relationship, a therapeutic alliance, between client and counselor. Enhancing this mutual partnership is a big part of the so called MI-spirit (Miller & Rollnick, 2002). Technical aspects refer to techniques of MI that will increase clients' in-session change talk and decrease sustain talk, which in turn will predict behavior change (Miller & Rose, 2009). Next is a look at MI-evidence from a relational aspect, followed by a technical aspect, in relation to the four principles.

Mechanisms of Change in MI

The emphasis on accurate empathy and reflective listening within MI is based on previous work indicating that relational factors might promote positive change in themselves (Miller & Rose, 2009). As a client-centered method embracing Rogers' supportive and emphatic counseling style (Hettema et al., 2005), the focus on relational factors is considered

"to be the foundation on which clinical skillfulness in motivational interviewing is built" (Miller & Rollnick, 2002, p.37). However, in their meta-analysis summarizing and evaluating the mechanisms of change in MI, Apodaca & Longabaugh (2009) argue that the early research, which MI is largely built on, does not seem to play a big part in generating client behavior change. They instead refer to studies showing mixed results, or not differentiating MI from a minimal/placebo comparison on such variables as empathy and rapport.

Nevertheless, relational aspects fostering the MI-spirit seem to play an important part in supporting in-session partnership and to generate subsequent change talk. Apodaca & Longabaugh (2009) concluded that while there is no support for MI-spirit as a prime candidate for behavior change, it is an important therapeutic skill supporting the client-counselor partnership in-session. However, they found only a few studies that met their inclusion criteria of most promising candidates for mechanisms of change. Similarly, another review support findings that clinician interpersonal skills positively effects client involvement and change talk in-session (Miller & Rose, 2009). The review refers to studies such as the Project MATCH research group, where short 4-session Motivational Enhancement Therapies (MET) based on MI were compared to two other 12-session treatment methods. By randomly selecting 38 studies from Project MATCH, researchers found strong support for a relationship between MI-consistent behavior from the counselor and client change talk, while MI-inconsistent behaviors were likely to be followed by sustain talk.

Further, Apodaca & Longabaugh (2009) argue that MI-inconsistent behaviors from the counselor are predictive of worse outcomes in-session, which seems to support the use of the MI-spirit and other MI-consistent behaviors from the counselor. Two examples of worse outcomes are higher levels of resistance and less engagement from the client (Apodaca & Longabaugh, 2009). Other studies similarly support the importance of therapist behavior,

most importantly MI-consistent behavior, to elicit client change talk (Moyers & Martin, 2006). In addition, Faris et al. (2009) stress the importance of a good in-session relationship and MI-spirit to set the stage for client self-healing behaviors, self-agency and subsequent healthy out-of-session behaviors. However, as previously noted many of these studies are limited in their predictive value from methodological issues; lacking experimental and full mediation studies of mechanisms of change (Apodaca & Longabaugh, 2009; Thirlaway & Upton, 2009).

Nevertheless, the first principle of MI, *expressing empathy*, is somewhat supported through evidence of MI-spirit being a mediator for a good client/counselor relationship. “The practice of MI without understanding and manifesting this spirit is like the words without the music of a song. It is missing something essential” (Miller & Rollnick, 2009, p.131). MI-Consistent behavior from the counselor in turn predicts increased change talk, which is the foremost proposed mechanism of change in MI (Glynn & Moyers, 2010; Hettema et al., 2005; Miller & Rose, 2009; Moyers & Martin, 2006).

Several studies support the finding that self-motivated change talk is essential to increase client motivation for behavior change in-session (Apodaca & Longabaugh, 2009; Hettema et al., 2005; Miller & Rose, 2009). Further, Scheel (2011) argue that change talk is not unique to MI and that variations of change talk are evident in different kinds of solution-focused approaches. Initially, MI change talk was studied as a concept in itself but have subsequently been divided into subcategories, which has yielded clearer evidence on what kind of change talk effects outcome the most (Miller & Rose, 2009). These linguistic subcategories are desire, ability, reasons, need and commitment. Results, using coding systems such as different versions of Motivational Interviewing Skill Code (MISC), support findings that the first four subcategories predict the last one, i.e. commitment, which in turn predict behavior change outcomes. Further, more aspects of change talk such as intensity,

duration and time of change talk in-session predict behavior change outcome in these studies (Hettema et al., 2005; Miller & Rose, 2009).

Thus, client level of commitment towards behavior change, and in particular increasing commitment during session, seems to affect outcome more than change talk in general, subscribed to the other four subcategories. This notion seems to support the second MI-principle of *developing discrepancy* as the client is supported in generating change talk to further the gap between current and ideal situation. In addition, Moyers & Martin (2006) argue that ambivalence is characteristic of the change process and that the frequency of change talk is expected to vary back and forth in-session.

Further, one meta-analysis shows a small to medium effect of increasing client experience of discrepancy on subsequent behavior change (Apodaca & Longabaugh, 2009). In addition, authors point out that the effect of developing discrepancy is important since it seems to be distinctive of MI, and could explain how MI-effective change occurs. Also supported is the fourth MI-principle; *supporting self-efficacy*, insofar as the counselor is supportive of client change talk and exploration. *Rolling with resistance* is a key ingredient of MI practice supported by the fact that studies show that therapist MI-inconsistent behaviors are associated with higher levels of client resistance (Apodaca & Longabaugh, 2009). Also, research indicates that MI is more useful with clients who are less motivated or ready for change, more oppositional or angry (Hettema et al., 2005). Further, there is evidence that other variables, such as therapists' level of training in MI, affect MI-skills which in turn has been shown to predict client outcomes (Miller & Rose, 2009).

However, due to factors such as lack of standardized assessment tools, unclear constructs of mediators of MI-effectiveness, and the paucity of data available for analysis, many studies fail to meet the standards of explaining mechanisms of change (Apodaca & Longabaugh, 2009; Miller & Rose, 2009). Also, many studies use comparisons with placebo

conditions which don't reveal if results are specific to MI or common for methods of motivational change in general (Apodaca & Longabaugh, 2009). In addition, it is unclear to which extent relational and technical factors contribute to MI effectiveness respectively (Miller & Rose, 2009).

In summary, many aspects of MI in-session behaviors have been studied and presented in at least two meta-analyses to investigate mechanisms of change (Apodaca & Longabaugh, 2009; Miller & Rose, 2009). These studies at large support a causal chain of behaviors that affect outcome as predicted by MI-theory; i.e. therapist behavior is linked to client behavior, which in turn is linked to session-outcome. In other words, therapist relational skills such as empathy and reflective listening are important behaviors to promote client change-talk, which is correlated with better session outcome when it includes commitment-talk. Further, these studies show that change talk is more related to better treatment outcome than therapist behaviors. However, many studies fail to meet the standards of explaining mechanisms of change. Also, studies don't reveal if results are specific to MI or how relational and technical components contribute to MI effectiveness respectively.

Client autonomy is an important aspect of the MI-spirit as previously mentioned, and is part of the fourth general principle of MI; *supporting self-efficacy*. Miller & Rollnick (2002) argue that the overall goal in MI is to increase intrinsic motivation so that change arises from within rather than being imposed from without, thus serving the person's own goals and values (Miller & Rollnick, 2002). Autonomy is similarly an important aspect of Self-Determination Theory in explaining self-motivated behavior change. Miller & Rose (2009) argue that although we have an understanding of different contributors to behavior change in MI, we still don't know whether they cause the change or not. Under these circumstances, could SDT help to explain MI-consistent behaviors' effect on client

motivation and behavior change (Miller & Rose, 2009), and perhaps increase awareness of why the effect occurs?

Self-Determination Theory (SDT)

Self Determination Theory (SDT) is a theory of self-motivated behavior change and personality development based on the assumption that "people have an innate organizational tendency toward growth, integration of the self, and the resolution of psychological inconsistency" (Markland et al., 2005, p. 815). The initial work of SDT dates back to the 1970s and early ´80s with experimental and field investigations of the effects of environmental events such as praise, rewards or directives on intrinsic motivation (Deci & Ryan, 2008; Markland et al., 2005). This research later led to investigations of volitional behavior more generally, and how people internalize and integrate extrinsic motivation and self-regulate their behaviors.

SDT proposes that all behavior can be understood as lying on a continuum ranging from externally (heteronomous) regulated behaviors to internally (autonomous) regulated behaviors reflecting the persons' level of commitment in, and endorsement of, an activity. These behaviors are associated with a wide variety of consequences such as level of effort, persistence, quality of experience and quality of subjective well-being. Autonomous behaviors generally seem to be more stable and enduring, and to have more positive effects on human health compared to heteronomous behaviors (Markland et al., 2005).

Also central to the theory is the focus on the effect of different environments in explaining psychological well-being and growth. These are examined from the outlook of whether three psychological needs are met; competence, autonomy and relatedness (Markland et al., 2005; Vansteenkiste & Sheldon, 2006). Environments that support and maximize these hypothesized universal needs are likely to increase individuals'

psychological well-being, internalized behaviors and optimal functioning across cultures (Deci & Ryan, 2008). The need for competence involves feeling confident in one's abilities and having the capacity to affect outcomes. Thus, exploring and mastering one's own environment and seeking challenge to support the need for growth and skill development is important. The need for autonomy is having a feeling of choice, volition and ownership regarding one's behavior. Further, feeling autonomous is having freedom of choice, not being controlled or compelled to act, and is not the same as being individualistic or independent of other people (Ryan et al., 2010; Vansteenkiste & Sheldon, 2006). Finally, relatedness is the need to experience connectedness with others, being cared for and having supportive and satisfying social relationships.

The psychological needs are based on years of research on intrinsic motivation and internalization (Deci & Ryan, 2008). The idea is that the quality of motivation, rather than quantity, is more important for predicting many important outcomes such as creative problem solving, effective performing and psychological health. Covered next is the central distinction between autonomous motivation and controlled motivation in SDT, reflected in the continuum of autonomy.

Continuum of Autonomy

On the far end of the heteronomous side of the continuum are behaviors motivated by *external regulation* such as rewards and punishment that are not under one's control, e.g. being forced by a counselor to change one's behavior. These behaviors are only considered to work under external pressure and result in poor quality and commitment. Somewhat more autonomously motivated are *introjected regulations*. These are behaviors motivated not by external controls but by internalized feelings of pressure to engage in an activity. Feelings of shame and guilt arise when failing, but feelings of pride and self-approval arise when

succeeding. These behaviors are generally unstable and ambivalent. A more self-determined behavior is *identification*, i.e. accepting to engage in an activity to achieve personally valued outcomes. These are accompanied with a sense of effort, commitment and positive experiences. When also connecting an activity with one's other core values and beliefs, *integrated regulation*, there is stable and fully self-endorsed behavior. Last and most autonomous and self-regulated are *intrinsically regulated* behaviors. These are behaviors engaged in not for any external motives but for the inherent satisfaction of doing them.

A central distinction is between *controlled* and *autonomous* motivations. External and introjected motivations are usually referred to as controlled motivations while identified, integrated and intrinsic motivation are referred to as autonomous motivations (Deci & Ryan, 2008; Vansteenkiste & Sheldon, 2006; Zuroff, Koestner, Moskowitz, McBride, Marshall & Bagby, 2007). Research shows that autonomously regulated behaviors are more stable, generates more positive experiences and is related to better treatment participation and outcomes in psychotherapy and health care (Markland et al., 2005).

Next is a look at important in-session outcomes from a SDT-perspective, using the theoretical framework of psychological needs and the continuum of autonomy.

SDT and In-Session Behaviors

SDT is increasingly being applied both as a guiding framework for clinical interventions and randomized clinical trials, and in psychotherapy, counseling and behavior change settings (Ryan et al., 2010). In SDT theory, autonomy support is of particular importance for client motivation in counseling settings (Ryan & Deci, 2008; Ryan et al., 2010). In autonomy-supporting contexts individuals are encouraged to base their actions on their own values and reasons, not feeling pressured to behave in a certain way. Autonomous behavior is facilitated and clients are helped to identify their own reasons for changing their

behavior without feeling pressured or manipulated toward certain outcomes. In other words, the aim is for the client to "own" the reasons for changing; ideally increasing autonomy and likelihood of success in behavior change (Ryan et al., 2010), while the therapist is required to be truly non-invested in a specific outcome (Ryan & Deci, 2008).

In addition, specific components of autonomy support has been identified through research, such as understanding and acknowledging individual perspectives, providing them with unconditional regard, supporting choice, minimizing pressure and control and providing meaningful rationale for requests or suggestions (Ryan & Deci, 2008). Further, research has shown that autonomy support leads to positive outcomes and self-determined forms of motivation in a large number of contexts (Ryan & Deci, 2008; Ryan et al., 2010; Vallerand et al., 2008). For example, Zuroff et al. (2007) assessed motivation for treatment, the therapeutic alliance and perception of autonomy-support in adults treated for major depression using one of three approaches; cognitive behavior therapy, interpersonal therapy and pharmacotherapy. Researchers found that perception of autonomy-support positively predicted motivation for treatment and therapeutic alliance (Ryan & Deci, 2008).

Further, Ryan & Deci (2008) argue that clients come to session for a variety of reasons and that these motives vary along a continuum of relative autonomy. For example, clients can be externally motivated to enter therapy, such as children or addicts connected to the legal system. In contrast, clients can be interested, curious and intrinsically motivated to join therapy. Thus, clients who enter therapy can be motivated along the continuum of autonomy for a number of reasons. This is supported by several studies indicating that individuals entering treatment for more autonomous reasons experience a number of benefits from therapy in contrast to individuals entering therapy for more controlled reasons (Ryan & Deci, 2008). For example, Pelletier, Tuson & Hadad (1997) assessed to which degree adult clients enter treatment for more controlled or autonomous reasons. Results indicate that more

autonomously motivated individuals see therapy as more important, satisfying and rewarding than less motivated individuals while they also experience less tension, distraction and depression in-session (Ryan & Deci, 2008). Although promising, the study suffered from several methodological weaknesses such as relying exclusively on self-report and cross-sectional design (Zuroff et al., 2007). Some research also highlights the importance of autonomy-support by significant others such as spouses or friends to enhance client motivation (Ryan et al., 2010).

Although the aim of the SDT approach to therapy is integration of values and behaviors within personality rather than behavior change per se, behavior change is likely to be better maintained if clients' experience of autonomy, relatedness and competence is maximized (Ryan et al., 2010). Importantly, Ryan & Deci (2008) argue that an awareness of psychological needs and the emotions that lead to fulfillment of needs are essential nutriments for growth, life-meaning and satisfaction. Consequently, the need for relatedness - the sense of being cared for and connected with the other – must also be met since it is "critical to internalization and valuing of the therapeutic process" (Ryan & Deci, 2008, p. 11). Similarly, Vallerand et al. (2008) argue that the messages and values reflected from the therapist may be more readily internalized by the client if the therapeutic alliance leads to relatedness satisfaction.

However, Ryan et al. (2010) refers to a study suggesting that autonomous motivation is a stronger predictor of improved outcome than therapeutic alliance. This study was based on assessing the effect of three randomly assigned treatments (CBT, IPT and Pharmacotherapy) on therapeutic alliance, patient autonomous motivation and therapist autonomy support in-session. Still, Ryan et al. (2010) argue that relational factors such as therapeutic alliance and empathy are important non-specific factors influencing autonomy and engagement in the counseling process. Scheele (2011) similarly suggests that an

interaction of working alliance and autonomous motivation are important for outcome, and they should not be considered independently. Further, Vallerand et al. (2008) argue that the need for relatedness, being an understudied area within SDT, needs to be studied more in order to understand its role in a variety of processes.

The need for competence is facilitated by autonomy in the SDT model of change. The idea is that once people have a high willingness to act and are volitionally engaged, they will be more eager to learn and apply new competencies and strategies (Ryan et al., 2010). The client is then afforded skills and tools for change and is supported with structure and direction when needed. Both autonomous motivation and feeling competent in carrying out change are correlated with better outcome including higher treatment attendance, less relapse, less dropout and enhanced well-being over the course of treatment (Ryan et al., 2010). In contrast to other related theories on competence such as Bandura's self-efficacy theory (1989), SDT predicts that competence alone is not sufficient and must be accompanied by volition or autonomy to ensure adherence (Ryan, Patrick, Deci & Williams, 2008).

Emerging evidence suggest that motivational processes related to SDT can be non-consciously primed, influencing perceptions and behavior. Non-conscious processes refer to unintentionally initiated processes, usually out of control and awareness for individuals (Levesque et al., 2008). Levesque et al. (2008) refers to studies showing that intrinsic and extrinsic motivation can be automatically triggered in different situations, depending on earlier associations related to motivation in a similar context. In one study (Levesque et al., 2008), individuals were primed with intrinsic motivation words such as choice, autonomy, interest and freedom, or extrinsic motivation words such as pressure, obligated, constrained and forced. Individuals primed with intrinsic motivation words showed greater interest in, and spent more time with, a subsequent unrelated task than extrinsically primed individuals.

Further, Vallerand et al. (2008) refers to a study were a loss of autonomy undermined intrinsic motivation by repeated presentation of controlling messages presented outside of awareness. In addition, Levesque et al. (2008) argue that exercising mindfulness is important referring to studies showing that individuals high in dispositional mindfulness better regulate non-consciously activated situations, feel self-determined even when primed with extrinsic motivation and have a stronger relationship between implicit and explicit emotional states. Also, exercising conscious control seems necessary when learning a new behavior or when overriding a maladaptive automatic process, made possible through representations of motivational states relevant to intrinsic and extrinsic motivations in individuals (Levesque et al., 2008). On the contrary, Aarts (2007) refer to studies showing that people can navigate their goal-directed behavior somewhat without the need of conscious control, e.g. through implicit affective-, habitual- or reflexive processes. By and large, more research is needed on non-conscious activation of motivational processes such as introjected- and integrated regulation in SDT theory (Levesque et al., 2008; Vallerand et al., 2008).

Furthermore, evidence is lacking to what extent certain psychological needs influence outcome, and the motivational consequences of preventing one or more needs (Vallerand et al., 2008). However, Ryan & Deci (2008) argue that since developmental need deprivation is an important aspect of psychopathology, therapists should foster integration and need fulfillment in clients. Further, it is unclear to what extent psychological needs are sufficient in modeling optimal functioning. For example, other aspects of well-being support such as mindfulness, energy and vitality has been increasingly integrated into SDT theory in recent years perhaps also contributing to outcome (Deci & Ryan, 2008).

Also, the concept of psychological needs is debated within psychology. SDT view needs as universal features of human nature, which evolved because of the adaptive advantages they afforded, while others view needs as acquired individual differences that

vary among persons (Vansteenkiste & Sheldon, 2006). In addition, it is unclear how certain contextual factors, such as a specific life domain, influence motivational outcome, and what level of motivation is optimal in different circumstances (Vallerand et al., 2008). Evidence suggest that the theoretical principles of SDT are sufficiently empirically supported through a variety of methodological designs, while a majority of studies on motivation and outcome are based on correlation and lacks experimental research (Thirlaway & Upton, 2009; Vallerand et al., 2008).

Summarizing the SDT literature, all three psychological needs are considered important aspects of the therapeutic process to facilitate client growth, integration and well-being. Evidence particularly suggests that clients experience more positive outcomes when experiencing autonomy-support in-session. Studies on non-conscious processes suggest that elements of SDT, such as extrinsic and intrinsic motivation, can be primed and that mindful individuals are better at regulating non-conscious processes. While the importance of psychological needs and autonomous motivation for optimal functioning are well-studied, it is somewhat unclear how contextual factors and level of motivation interact. Finally, the theoretical principles of SDT are well-studied, but evidence on the impact of SDT on motivational outcome is mostly limited to studies based on correlation.

Client autonomy is the target of further investigation in models connecting MI with SDT (Markland et al., 2005; Vansteenkiste & Sheldon, 2006). Next is a look at the evidence of if, and how, these models complement each other.

MI and SDT – A Comparison

Some studies suggest that the well-established theoretical framework of SDT might explain the effectiveness of MI and thus support a better theoretical model on its mechanisms of change (Markland et al., 2005; Vansteenkiste & Sheldon, 2006). Since SDT has developed

a thorough model connecting intrinsic motivation to level of self-determined behavior in the continuum of autonomy, theorists argue that this model could benefit MI-theory by giving it more validity and depth. On the other hand, SDT could benefit from methods of behavior change used in MI (Markland et al., 2005; Vansteenkiste & Sheldon, 2006).

Vansteenkiste & Sheldon (2006) argue that SDT and MI share a common origin and complement each other well since both methods were developed out of dissatisfaction with existing theoretical frameworks; especially non-phenomenological, confrontational and prescriptive models of change. Further, they suggest that the basic tools for conducting treatment and enhancing client treatment motivation are generally the same since both methods share the importance of supporting client autonomy in-session (Vansteenkiste & Sheldon, 2006). They also share common meta-theoretical assumptions of the client as an active, growth oriented organism with strong inner resources and ability to realize the natural tendency towards personal development and change. In addition, Vansteenkiste & Sheldon (2006) argue that both methods can be applied to enhance almost any form of treatment; being “content-free” and primarily concerned with the manner in which treatment interventions are delivered rather than the method itself.

Markland et al. (2005) similarly argue that MI is supportive of need-satisfaction since MI sets the stage for satisfying psychological needs. Consequently, a need for competence is supported in MI by the provision of clear information, helping the client to embrace realistic expectations, giving positive nonjudgmental feedback and setting appropriate self-selected goals. Autonomy in MI is supported by avoiding confrontation, by developing discrepancy to support change talk, exploring behavioral options and encouraging clients to choose their preferred behavior and course of action. Finally, relatedness is supported in MI by the expression of empathy, avoidance of criticism and blame, non-contingent support and genuine interest form the counselor.

However, the autonomy-supporting resemblance between MI and SDT has recently been criticized by Ryan et al. (2010) arguing that the growing emphasis in the MI-literature on motivating and directing change talk (Miller & Rose, 2009) could jeopardize client autonomy and self-determination. Markland et al. (2005) similarly argue that adopting a mechanical approach to the implementation of MI principles and strategies risk leading individuals to less self-determined forms of motivation such as introjected regulation, i.e. feeling a pressure to act. They refer to different studies were the absence of autonomy-support is likely to promote introjected regulation. In one laboratory study by Deci, Eghrari, Patrick and Leone (1994), three aspects of support were manipulated; providing a meaningful rationale for engaging in the task, acknowledging the participants' perspectives and emphasizing choice. In the presence of only one of these factors, introjected regulation was promoted and full integration inhibited (Markland et al., 2005).

However, Miller & Rollnick argue that MI could not manufacture inherent motivation for change for someone not having such motivation stating that "MI is not a way of tricking people into doing what they don't want to do" (Miller & Rollnick, 2009, p. 131). Further, Miller & Rollnick (2002) argue that it is sometimes better to adopt a non-directive approach in counseling when the change goal is not so obvious, e.g. when a couple is deciding whether or not to adopt a child, while using a more direct approach is sometimes necessary, e.g. improving glucose control with a client struggling with Type II diabetes.

Similarly to Markland et al. (2005), but having MI as a reference point, Vansteenkiste & Sheldon (2006) argue that the four principles of MI can be understood in relation to SDT terminology. Consequently, an empathic counseling style is related to the fulfillment of the need for relatedness. Rolling with resistance is guiding the need for autonomy since the idea is to help people to see what they are doing and how to make a whole-hearted and personally committed decision about what to do next. Similarly, developing discrepancy by eliciting

arguments from the client to make the change is likely to enhance the personal decision to make a change, thus supporting autonomy. Further, supporting people's feeling of self-efficacy and enhancing confidence in the process of change is equated to satisfying the need for competence. Thus, Vansteenkiste & Sheldon (2006) argue that applying the key principles of MI during therapeutic interventions produces the desired treatment outcome by helping the client to satisfy basic psychological needs.

MI has been defined in terms of evoking intrinsic motivation for change from presumed resources within the client, and on affirming client's right to autonomy and self-direction (Miller & Rollnick, 2002). However, Markland et al. (2005) argue that it is often unrealistic to expect clients to become truly intrinsically motivated to engage in new behavior in contexts such as behavior change counseling. By arguing that certain behaviors such as adopting and maintaining a diabetic treatment regimen or giving up alcohol, drugs or smoking are unlikely to ever be experienced as intrinsically enjoyable or motivating, Markland et al. (2005) suggest that MI could more accurately be defined as a method of promoting autonomous, rather than intrinsic, motivation for change. In other words, MI would benefit from adopting the continuum of autonomy of self-determined behavior from SDT since most behavior change outcomes are related to autonomous motivation, and not intrinsic motivation.

Vansteenkiste & Sheldon (2006) similarly argue that changing one's behavioral patterns is primarily instrumental to the goal of coping with a difficult and challenging problem, and not intrinsically motivating of itself. Further, they argue that MI could benefit from considering the quality of motivation, such as different stages of controlled and autonomous motivation, and not so much the quantity of motivation such as building a strong intention to change. An example of the risk of building a strong intention to change, not considering the quality of motivation, is supporting clients' strong motivation to stop

drinking because of experiencing shame in front of colleagues, not considering if the intention is aligned with the self of the person.

While SDT's basic theoretical premises have received much support, Vansteenkiste & Sheldon (2006) argue that the theory has received less support in the fields of clinical psychology and psychological counseling, and would benefit from integrating some psychotherapeutic techniques from MI to receive more recognition within applied psychology. Further, they suggest that three experimentally differentiated components of autonomy-support in SDT; acknowledging the perspective of the client, providing as much choice as possible and providing a meaningful rationale where choice cannot be provided, could use further elaboration and application by MI techniques. Consequently, consistent with the concept of autonomy-support in SDT is the MI-technique of *mutual agenda setting* to support client's own goals in the change process.

Also autonomy-supporting are the concepts of *reflective listening*, i.e. reflecting client's own words to increase self-awareness and autonomous choice, and *summarizing*, i.e. helping to facilitate the integrative process by drawing together the material that has been discussed. Further, authors argue that labeling the clients, i.e. placing clients in a certain category based on diagnostic criteria, can produce a defensive attitude not supporting self-esteem and competence. The importance of therapist's neutrality is also stressed, such as not jumping to conclusions about clients' perception of the problem or willingness to do something about it. Finally, by asking open-ended questions instead of closed-end questions, clients' avoid adopting a passive role by giving simple or factual answers. Instead, open-ended questions allow clients' to fully express and explore their concerns in an autonomy-supported way.

In conclusion, besides sharing common meta-theoretical assumptions about client ability and growth, MI and SDT are easily adopted into different environments where

autonomy-support is needed. The concept of psychological needs seems to fit well with the four principles of MI, sharing a common understanding of empathy/relatedness, how to provide clear information to increase self-directed goals and competence, and the importance of supporting change talk and autonomy in-session. While sharing these assumptions, some authors (Markland et al., 2005; Ryan et al., 2010) argue that the directive approach of MI could diminish client self-determination and autonomy, thus jeopardizing lasting positive change. Further, MI could benefit from qualifying instead of quantifying motivational support while adopting the continuum of autonomy from SDT to promote autonomous, rather than intrinsic, motivation for change. Conversely, SDT could benefit from adopting therapeutic techniques from MI, such as setting a mutual agenda, reflecting and summarizing, to further support client autonomy and easier translate the concept of autonomy-support into practice. The theoretical assumptions and conclusions from matching SDT theory with MI-methodology has yet to receive more empirical support and are mainly suggestive of better outcomes in self-motivated behavior change.

While both MI and SDT, as many social-cognitive theories of behavior change, are limited in their predictive value from methodological issues such as studies based on correlation and self-reports', they are nevertheless well-studied and have a somewhat well-defined prescription for increasing client motivation to change. Next is a look at neural correlates of behavior relevant to in-session behaviors and client motivation to examine resemblances and differences and put social cognitive theories into perspective.

Neuroscientific Evidence on Factors Facilitating Client Behavior Change

Linden (2008) argue that brain correlates of psychological interventions has a long history going back to at least Cajal, the founder of the microscopic study of the nervous system. Similarly, Freud (1895) suggested that changes in behavior, affect and cognition that

are mediated by psychotherapies undoubtedly have biological underpinnings (Roffman et al., 2005).

However, the functional neuroimaging techniques that allow us to see the changing brain activity and metabolism in response to psychological interventions have only become available over the past two decades. Further, the growing synthesis of neuroscience and psychology has mainly focused on the biological etiology of mental disease, such as obsessive compulsive disorder, anxiety and depression (Cappas, Andres-Hyman & Davidson, 2005; Linden, 2008). These studies have often been conducted using symptom provocation procedures activating networks of the brain for comparison with control conditions, and have generated findings of particular networks in the brain related to unhealthy emotional and cognitive patterns targeted by psychology (Linden, 2008; Roffman et al., 2005). Further, Linden (2008) argues that the application of neuroscientific methods in this field has not been straight forward since psychiatry, unlike other fields of medicine, lack reliable biological markers. Thus, dependent variables first need to be determined, such as brain correlates of specific symptoms, metabolic states of a syndrome or activation patterns of dysfunctional cognitive processes.

In spite of these and other shortcomings of neuroimaging techniques, Roffman et al. (2005) argue that evidence from neuroimaging studies converge on mechanisms by which therapy changes the brain, while little can be concluded about the precise mechanisms and neurobiology involved in these changes. Further, imaging results have influenced or motivated new treatment approaches such as Transcranial Magnetic Stimulation (TMS), e.g. over the temporal lobe to attenuate hallucinations, and self-regulation techniques such as Neurofeedback for chronic pain (Linden, 2008).

Cappas et al. (2005) argue that advances in neural science need to move beyond reductionist etiology of disease to a broader conceptualization of human experience,

translating findings from neuroscience to practical tools for clinical settings. Further, they suggest that neuroscientific findings could inform clinical practice by educating practitioners and clients of the possibilities of re-learning and modifying the brain. In addition, they propose and illustrate a set of neuroscientific principles for use in psychotherapy, and their implications for clinical practice. Some of these principles suggest that experience transforms the brain, strengthening or weakening neural connections. Other findings indicate that cognitive and emotional processes work in partnership, and that bonding and attachment provide the foundation for change, while imagery activates the same brain systems as real perception does.

Next is a look at some of these findings and other neuroscientific studies related to in-session behaviors.

The Mirror System and Self-Related Processing

In accordance with the importance of bonding and attachment for change (Cappas et al., 2005) more studies indicate that this principle play an important role in motivating behavior and behavior change (Lieberman, 2010; Stephens, Silbert & Hasson, 2010). Cappas et al. (2005) argue that, although early relationships set the stage for future interpersonal attachment, these systems remain plastic throughout life implying that the therapeutic relationship could help clients to integrate neural functions, modify neural systems, and enhance emotional regulation.

According to a recent review of the field of social cognitive neuroscience (Lieberman, 2010) there is compelling fMRI data to suggest that humans have a network of *mirror neurons*, similar to the discovery that monkeys have a set of neurons in the prefrontal cortex (PFC) activated by watching and performing goal-directed behaviors such as grabbing an object. In humans, regions that are identified as central to the mirror system such as the

bilateral posterior ventrolateral PFC and bilateral anterior IPL (inferior parietal lobule) have been activated by similar actions, but also by a set of other relationship-related behaviors such as communicative hand gestures and mimed actions, being touched or watching another person being touched, and during observation and imitation of facial expressions (Lieberman, 2010).

Further, a study by Cross, Kraemer, Hamilton, Kelley, & Grafton (2009) indicate that not only watching a behavior affects the mirror system activity, but also to what degree the action is motivational relevant (Lieberman, 2010). In this study subjects were scanned while watching dance routines, some that would be learned and others that would not. The mirror system was active for both kinds of dances before the training, but only the practiced dances produced nearly the same level of activation in the mirror system at the posttest; thus leading the author (Lieberman, 2010) to suggest that mirror system activity is more related to how motivational relevant actions are to oneself, than having a preexisting representation of the action. In other words, behaviors that are motivational relevant could increase mirror system activity more than just knowing about, and observing, these behaviors.

Similarly to mirror neuron activity in observation of action, Stephens et al. (2010) did a study indicating that listener's brain activity mirrors the speaker's brain activity during successful communication. Using fMRI, researchers recorded brain activity of a speaker telling a long, unrehearsed personally relevant story in English. Next a Russian-speaking person was recorded telling a similar relevant unrehearsed real-life story in Russian. Eleven listeners then listened to the recorded stories while their brain activity was measured. None of the participants understood Russian but were nevertheless instructed to attend to the story and provide a written account of the story following the scan. Authors concluded that listeners' brains exhibit joint, and temporally coupled response patterns, and that more extensive neural couplings result in more successful communication (Stephens et al., 2010). Moreover, some

brain regions were identified in which the activity of the listener's brain precedes the activity in the speaker's brain. In addition, the listener's anticipatory responses such as predicting upcoming words were highly correlated with the level of understanding, "indicating that successful communication requires the active engagement of the listener" (Stephens et al., 2010, p. 14428).

In another study, Chua, Ho, Jasinska, Polk, Welsh, Liberzon and Strecher (2011), argue that self-related processing could underlie the efficacy of tailored health messages to promote a desirable health-behavior change. In this study, 91 smokers participated in an fMRI session and a tailored smoking-cessation program. Authors found that increases in activation in self-related processing regions in the brain predicted quitting during a 4-month follow-up. They conclude that self-related processing can allow for deeper processing and more efficient integration of health-change goals into one's learning, self-schema and action plans, culminating in behavioral change.

In addition, other studies (Lieberman, 2010) indicate that personal moral reasoning, in contrast to impersonal moral reasoning, recruit more regions associated with mentalizing, i.e. "individuals' ability to infer the contents of another's mind" (p. 158), and self-referential processing, while damage to these regions, including ventromedial and medial PFCs has been associated with impaired ability to make personal, but not impersonal, moral judgments. Further, Mitchell, Macrae and Banaji (2006) used FMRI to examine how subjects make mental state inferences when the other person is perceived to be similar, or dissimilar, to one-self. Mentalizing about similar others produced more activity in self-referential regions (ventromedial PFC) whereas mentalizing about dissimilar others activated a more dorsal subregion of medial PFC, suggesting that subjects use knowledge about themselves to infer mental states of similar others.

Thus, these studies when put together suggest that self-related processing might increase in situations where relating to oneself is beneficial, such as when engaging in personal moral reasoning, tailored health messages or interacting with similar others, allowing for deeper processing and learning. Also relevant to in-session settings are findings that greater activity in medial PFC is observed when individuals reflect about their current self, in comparison to past or future self, indicating that past and future selves may be treated in some ways as if they are different individuals from oneself (Lieberman, 2010).

Lieberman (2010) also refers to four fMRI studies that have examined the neural basis of why putting feelings into words can dampen emotional responses (Pennebaker & Beall, 1986). In these studies, subjects chose affective labels to characterize negative emotional images while being scanned. While subjects were not trying to regulate their emotional responses, results indicated that right ventrolateral PFC activity was associated with diminished amygdala responses to the negative stimuli, thus indicating that negative emotional responses were moderated through labeling emotions. Further, Gazzaniga et al. (2008) argue that the neural systems of emotion and other cognitive functions are interdependent through the “high road” of processing emotional stimuli, i.e. processing from the cortex to amygdala.

Motivation and Reward

Viamontes & Beitman (2006) argue that while most common psychotherapeutic interventions are “top-down” approaches, i.e. they focus on higher order functions such as affect, cognition and behavior; they should also consider “bottom-up” processes, i.e. emotional communication and the neural circuitry that generates higher order functions. Further, they suggest that by understanding the expression of the basic core survival mechanisms and major behavioral drivers including memory, subconscious neural content

and reward circuits, we could inform psychotherapeutic practice and facilitate behavior change. The major motivational systems for detecting potential reward and risk in the brain include the rewards circuits, i.e. the mesocortico-limbic dopamine system (Linke, Kirsch, King, Gass, Hennerici, Bongers & Wessa, 2010) and amygdala-orbitofrontal circuits, while activated memories and subconscious contents can induce internal states and motivational direction that influence the probability of specific behavioral responses (Viamontes & Beitman, 2006). Further, while motivation has been associated with the orbitofrontal cortex, executive functions have been associated with dorsolateral prefrontal cortex (Spielberg et al., 2010). A further distinction is between approach systems, generally associated with reward and positive outcomes (left PFC) and avoidance systems, associated with punishment and right PFC activation (Spielberg et al., 2010). However, Daw & Shohamy (2008) argue from reviewing evidence that habitual stimulus-response learning; involving reward systems in the brain, could also work in conjunction with higher-order goal-directed processing and structures involving memory, thus questioning the distinction between motivational systems in behavior.

Lieberman (2010) refers to studies indicating that enacting or being the recipient of prosocial behavior, such as being treated fairly or engaging in charity, activates the ventral striatum, an area that has been commonly associated with reward responses to primary reinforcers (i.e. behaviors that are inherently enjoyable and no learning is necessary for them to be reinforcing), and nonsocial reinforcers such as drug cues for addicts, money and erotic images. In one study, Moll and colleagues (2006) asked people to accept or reject each of a series of propositions that would lead to positive, negative or neutral financial outcomes for oneself and/or for different charities. Increased ventral striatum activity was observed in trials in which subjects could gain money with no negative consequence for the charity and in trials in which the charity would gain while the subject would lose money (i.e. donation).

Lieberman (2010) suggest that these results indicate that inclusion in social groups has been critical from an evolutionary perspective, for survival and sharing of needed resources, thus being highly rewarding to us. Similarly, he refers to studies (Eisenberger, Gable & Lieberman, 2007; Eisenberger, Lieberman & Williams, 2003; Masten, Telzer & Eisenberger, under review; Way, Taylor & Eisenberger, 2009) indicating that brain regions responsible for the distress of social pain, like exclusion, parallel findings from the physical pain literature.

Further, another study by Cohen, Schoene-Bake, Elger and Weber (2008), used MRI and self-questionnaires to assess individual differences in novelty seeking and reward dependence. Results indicated that individual differences in neural connectivity between prefrontal cortex and striatum predict reward dependence such as a tendency to rely on social approval and to continue previously rewarded behavior. Similarly, individual differences predict novelty seeking such as looking for and feeling rewarded by new experiences.

Linke et al. (2010) similarly used fMRI and self-report questionnaires to extend previous results of individual differences in reward-processing (Cohen et al., 2008) to investigate whether motivational orientation, i.e. intrinsic or extrinsic motivation, influence the way positive or negative feedback is processed during learning situations. They used probabilistic reversal learning tasks; involving subjects being told that they could learn which chosen card on a screen would either generate money or make them loose money. Studying neural response changes to reward delivery, punishment and behavioral switching and the impact of motivational orientation on these processes, authors concluded that individual differences in motivational dispositions on the neural processing of reward differ. Individuals high on intrinsic motivation showed a negative correlation with reward processing while individuals high on extrinsic motivation showed higher neural responses to monetary reward in areas commonly associated with reward. However, learning was not affected by motivational orientation. In addition, findings are limited due to not separating reward

anticipation and reward delivery and using insufficient personality measures of individual differences (Linke et al., 2010).

Another recent study (Murayama, Matsumoto, Izuma & Matsumoto, 2010) confirms the results showing that performance-based extrinsic reward can undermine a person's intrinsic motivation to engage in a task; *the undermining effect*. Subjects were engaged in a stop-watch (SW) exercise, one group receiving and another group not receiving monetary reward (control group). After being scanned by fMRI, a free-choice period of playing the SW task lead to subjects being scanned again, finally leading to a second free-choice period of playing. Result indicated the presence of the undermining effect; thus participants in the reward group played the SW task during the free-choice period significantly fewer times than did those in the control group.

Automatic Processes

Based on two studies, Lieberman, Ochsner, Gilbert and Schacter (2001) argue that behavior change can be a relatively automatic process that does not require explicit memory for, or consciously controlled processing of the discrepancy between attitude and behavior. Using a free-choice paradigm, they examined whether attentional resources associated with working memory are a necessary component of behavior-induced attitude change under normal and cognitive-load conditions. Healthy subjects and patients with anterograde amnesia where asked to rank their liking for several items in a category, and after choosing one, re-rank their choice again, typically resulting in subjects liking the chosen item more. However, authors argue, if conscious processing and working memory is involved during this task, the amnesic patients would subsequently not be able to rank the chosen item higher. They found that both amnesics and normal participants showed as much attitude change as did control participants regardless of study condition, i.e. under normal or cognitive-load

condition, concluding that attitude change need not be affected by cognitive evaluations. Further, they argue that these results indicate that self-perception theory (Bam, 1972) and cognitive dissonance theory (Festinger, 1957); both explaining attitude change with elements of explicit memory and conscious processing, need clearer specification of their processing components.

In addition, Lieberman (2010) concludes that assigning agency to an observed behavior and forming an intention to act may depend on different neural systems, referring to studies based on two experimental approaches; examining neural bases of freely chosen self–initiated actions to externally triggered actions, and creating discrepancies between one's behavior and the visual presentations of one's behavior. Studies indicated that forming an attention might rely on structures on the medial walls of the cortex, whereas assigning agency to an observed behavior involves a lateral region of parietal cortex. Viamontes & Beitman (2006), using the visual cortex as an example, argue that while a vast array of information is internalized and represented in the primary sensory cortices, only a limited amount of information reaches consciousness due to an exclusionary process when other visual areas are involved to represent concrete properties like shape, orientation or color. Thus, with each level of abstraction, some of the information that defines the uniqueness of a perceived object is "left behind", while the information is neither lost nor devoid of effects. Consequently, they argue that nonconscious visual information can nevertheless cause activation of neural structures that generate emotions (Viamontes & Beitman, 2006).

In addition to the abovementioned study on elements of MI-methodology (Lieberman et al., 2001), another study used fMRI to examine changes in neural response to alcohol cues following client language in adults with alcohol dependence (Feldstein Ewing, Filbey, Sabbineni, Chandler & Hutchison, 2010). 10 adults were presented with Change Talk (CT) and Counter-Change Talk (CCT) derived from their pre-scan MI session, during the

presentation of alcohol cues. Researchers wanted to know to which extent client CT reduces neural activation in reward areas in response to alcohol cues. They found that there was significant neural response to alcohol cues in several key reward areas, such as orbitofrontal cortex, nucleus accumbens, anterior insula, posterior insula, caudate, and putamen following CCT, while there were no areas of significant reward activation following CT. They conclude that CT may be effectively inhibiting activation in brain regions that respond to the salience of alcohol cues, but that results are preliminary due to a limited sample-size not having enough power to determine the direction and strength of correlation. Other limitations of the study include only studying a specific group of patients; i.e. alcohol-dependent participants actively seeking interventions after a single one-hour MI-intervention. Thus, while confirming earlier social-cognitive studies on the efficiency of change talk in MI and suggesting it to be an important avenue for future research (Feldstein et al., 2010), this preliminary data needs to be confirmed, e.g. with a broader range of alcohol users, using control groups and comparing to other behavior change interventions.

In conclusion, neuroscientific evidence related to in-session behavior has been presented from different perspectives; the mirror system and self-related processing, motivation and reward, and finally automatic processes. Next is a discussion of the evidence presented in this essay, including a look at central themes and dissimilarities.

Discussion

The main purpose of this essay has been to present evidence on facilitators of client motivation for behavior change in-session. In doing so, two different, yet similar, methods of motivating human growth and self-determined behavior based on social-cognitive theory were examined both theoretically and practically in empirical studies. In comparison, neurocognitive studies related to behavior change and self-determined motivation were

presented to look at the issue of self-motivated behavior change from a neuroscientific perspective.

Some authors suggest that looking at theories from a larger context, comparing methodologies and theories makes sense since different perspectives are inherently limited in their prediction of a phenomenon due to limitations of research designs and other factors (Roffman et al., 2005; Thirlaway & Upton, 2009). For instance, Thirlaway & Upton (2009) refers to meta-studies on correlational designs, suggesting that at best 30 percent of the variation in behavior can be explained by intention. Similar restrictions on data to explain behavior, such as connecting studies built on fractionation of function to behavior, are also apparent in neurocognitive studies (Daw & Shohamy, 2008). However, Roffman et al. (2005) also argue that there are differences in rationale, efficacy and techniques of various modalities making it difficult to compare them directly. However, given these shortcomings, one could argue that different methodologies and theories would inform the field of motivated behavior change in large and generate positive outcomes, such as refined theories and better methods of behavior change (e.g. Cappas et al., 2005).

While MI and SDT are rooted in the same tradition of humanistic psychology, sharing similar assumptions of human nature as “inherently trustworthy, growth-oriented and guided by choice” (Ryan et al., 2010, p. 226), neurocognitive evidence both support and contradict this basic assumption. In addition, other health behavior models argue against the notion that individuals are guided solely by choice and intention, ignoring other factors that might affect outcome. Thus, rather than being a continuous and sole factor toward behavior change, intention could be a motivating factor in different stages through the process of behavior change.

However, Miller & Rollnick (2009) argue that MI is not meant to function as a stand-alone method for behavior change, emphasizing its supplementary function in other methods of behavior change. Further, they suggest that the method is supposed to function in two phases, first motivating the client, and secondly supporting commitment towards change (Hettema et al., 2005). Thus, while on one hand explaining mechanisms of change in terms of self-determined choice mediated through change talk, MI is preferably used along with other, more directive approaches to generate positive behavior change. This somewhat paradoxical notion is defended by Miller & Rollnick suggesting that some situations might call for the use of MI alone, while other situations benefit from using supplementary methods of behavior change (Miller & Rollnick, 2009).

Further, in contrast to Miller & Rollnick's (2002) assumption that change should arise from the inside rather than being imposed from the outside, neurocognitive evidence indicate that behavior-induced attitude change can be a relatively automatic process, and that directive elements in MI such as generating change talk might involve more elements of automaticity and unconscious processing than previously assumed. The study by Lieberman et al. (2001) indicates that two main influences of MI-methodology to increase positive change talk and ambivalence; self-perception theory and cognitive-dissonance theory, are based on rather automatic processes. Thus, generating positive client commitment towards behavior change through change talk might not be particularly self-determined and intentional from a client perspective after all. Further, Ryan et al. (2010) argue that implicit strategies are common for process-oriented models such as MI and SDT in the process of generating intrinsic motivation for change.

In addition, while supporting the importance of relational components evident in both MI and SDT, neuroscientific evidence indicate that *mirror neuron systems* mediates largely

unconscious behaviors that could affect the interpersonal communication and interaction between client and counselor in-session. Based on this, one might argue that client resistance towards initiating behavior change could be affected largely by unconscious priming from observing therapist behavior. However, MI, somewhat intuitively adopts this notion suggesting that client resistance is not a problem of the client, but rather a relationship problem of which the therapist is supposed to be aware of and monitor by changing behavior towards client (Miller & Rollnick, 2002). Further, by adopting neurocognitive findings suggesting that similar mirror system effects are activated during successful communication, behavior change might benefit from active engagement in communication. This fits nicely with MI and SDT's emphasis on establishing a positive mutual relationship in-session, not arguing for change or creating unnecessary tension between counselor and client. In addition, increased intrinsic motivation from reward-related processing in the brain facilitated by creating an environment of novelty and exploration (Oudeyer, Kaplan & Hafner, 2007) corresponds with the idea of creating a safe environment for exploration and internalization of positive values, supported by MI- and SDT-practice.

Moreover, neurocognitive studies confirm the importance of supporting autonomy and competence when communicating tailored health messages based on individual characteristics and interest, evidenced by studies suggesting that increased self-related neural activity is related to deeper processing and learning (Chua et al., 2011; Lieberman, 2010). In accordance with the three components of autonomy-support suggested by Vansteenkiste and Sheldon (2006), i.e. acknowledging the perspective of the client, providing as much choice as possible and providing a meaningful rationale where choice cannot be provided, the perspective of the client is respected thus setting the stage for self-relating processing. Consequently, increasing self-referential change talk and letting the client set the agenda might increase motivation and learning of new behaviors.

Further, self-referential change talk is facilitated in MI partly by reflecting, summarizing and asking open-ended questions to help clients explore possibilities and values. In addition, conveying similarity with the other, as could be suggested by using these MI behaviors, might benefit behavior change by increasing interpersonal liking, feelings of understanding and client integration. Thus, in spite of concerns that MI might jeopardize client autonomy and self-determined behavior by carelessly promoting change talk, there is neurocognitive evidence of how promoting self-related processing in the brain could benefit learning through deeper neural processing.

Markland et al. (2010) argue that intrinsic motivation, as defined by SDT-terminology, is not to be expected when clients face difficult or challenging issues. However, neuroscientific research indicates that reward systems, typically associated with primary reinforcers, i.e. behaviors that are inherently enjoyable, could be mediated by other contingencies not related to substance abuse or other challenging addictions mostly encountered in MI-session. Such rewarding contingencies include engaging in prosocial behaviors such as giving charity or donations. Thus, some individuals might be motivated to engage in socially promoted behaviors from rewarding feelings of acceptance from similar others and from being included in social groups. While there is no explicit aim to increase similarity or inclusion in social groups during a counseling session such as MI, there is nevertheless focus on increasing relatedness through *expressing empathy*, and resolution of interpersonal conflict between counselor and client through the principle of *rolling with resistance*. While this might contribute to increased prosocial behavior towards others in-session, the argument rather shows that reward circuits in the brain might be activated for more inherently positive reasons than addictive behavior in-session, thus not excluding the possibility of facilitating intrinsic motivation in-session.

On the other hand, results from a neurocognitive study (Feldstein et al., 2010) indicate that change talk might prove effective from deactivating common reward areas in the brain. However, these results are mediated by deactivation of alcohol-cues from change talk, thus diminishing the motivating aspects of having an urge to drink.

The continuum of autonomy and the distinction between extrinsic/controlled and intrinsic/self-determined motivation is supported by neurocognitive studies insofar as performance-based extrinsic reward can undermine a person's intrinsic motivation to engage in a task, *the undermining effect* (Murayama et al., 2010), while also showing that individual difference exist in reward-processing (Cohen et al., 2008; Linke et al., 2010). However, these studies did not include measurements of level of self-determined behavior, thus not confirming the basic taxonomy of self-determination in SDT. However, Murayama et al. (2010) conclude that the results from their study on the undermining effect of monetary reward on intrinsic motivation nevertheless lends "support for the recent psychological theory that the undermining effect is closely linked to a decreased sense of selfdetermination" (p. 20914) referring to studies by SDT originators Ryan and Deci.

Conclusion

While many of the basic assumptions of MI and SDT theory is supported by both social-cognitive and neurocognitive findings, evidence exist that self-motivated behavior change is not necessarily particularly guided by choice since both relational and technical aspects of MI-practice involves process-oriented motivational guiding, largely unavailable to client consciousness. Similarly, SDT-terminology of self-determined behavior might not involve a high degree of "self-determination" insofar as intentional behavior is considered. However, many of the assumptions in both MI and SDT, such as the formatively guiding terminology of psychological needs, are supported by studies in cognitive neuroscience,

indicating that supporting autonomy, relatedness and competence is highly valuable to the process of facilitating client motivation for behavior change in-session.

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