

THE DOWNSIDE OF SELF-ESTEEM STABILITY: DOES  
STABILITY IMPEDE FLEXIBILITY?

by

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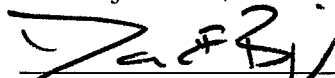


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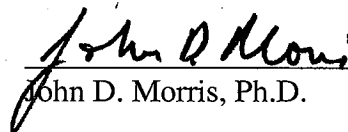
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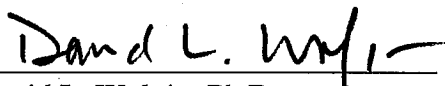
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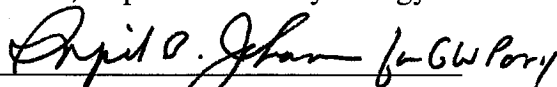


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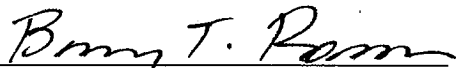
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## ABSTRACT

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Self-concept stability was tested in three studies to examine the relationship between stability in one's self-concept and the ability to adapt to changes in the social environment. Much of the literature on the topic of self-stability emphasizes the functional benefits of stability and the negative outcomes associated with instability. Dynamical systems theory purports however that stability in a dynamical system is indicative of a loss of complexity that limits the range of the systems behavior. Accordingly, this series of studies tests the idea that a stable self-system may have a more limited range of behaviors than unstable self-systems and this may have implications for adapting to changes in one's social environment. The overarching hypothesis is that compared to those with less stable self-views, those with stable self-views will demonstrate lower levels of flexibility of behavior in response to changing social demands. Study 1 assessed the dynamics of participants' evaluations by asking

them to complete a self-descriptive recording and evaluate their self-descriptions using the mouse paradigm procedure. Participants also completed a series of questionnaires assessing personality factors and behavioral and cognitive flexibility. Study 2 expanded on the first study by adding a well-validated measure of self-esteem stability and a social conceptualization of behavioral flexibility. Study 3 tested participants' willingness to demonstrate behavioral flexibility in an actual social situation and examined the effects of stress on the relationship between stability and flexibility. Results suggest that those with more stable self-concepts demonstrate less flexibility in response to their social environment than those whose self-concepts are less stable and that stress tends to amplify this relationship. Future research is also recommended to achieve a fuller understanding of stability in the self-system and its implications for social functioning.

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## INTRODUCTION

The complexity of interacting with others and successfully navigating of our social environment requires not only the maintenance of consistent patterns of response to certain conditions, but also the ability to adapt to changing social demands. The self-structure plays a prominent role in self-regulation and social interaction, permeating virtually every aspect of a person's experience from a chance glance in a mirror, to negotiating social roles and interacting with loved ones or strangers.

Dynamical systems theory (Nowak & Vallacher, 1998) purports that the self is a complex system that is made up of a number of interacting cognitive elements representing specific pieces of self-relevant information. These elements can be quite diverse in content (e.g., memories, self-perceived skills and personality characteristics, shortcomings and accomplishments, physical appearance, task performance) but can achieve integration and organization through higher-order structures such as evaluative consistency (i.e., consistency in the positive and negative valence of self-relevant thought) thereby providing the stability needed for self-regulatory processes.

Previous studies have consistently shown that there are individual differences in stability of self-concept (e.g., Kernis, 2005) and that this has implications for psychological well being and self-regulation. These studies generally emphasize that having a stable self-esteem is exclusively advantageous whereas an unstable self-esteem is reported as relatively maladaptive and the basis for myriad adverse outcomes.

Although several avenues of research emphasize the benefits of stability in the self-system, dynamical systems theory purports that as a system becomes more stable it experiences a loss of complexity that limits the systems range of behaviors

Accordingly, this series of studies examines a possible downside to self-concept stability by testing the idea that those with more stable self-concepts might have a more limited range of behaviors than those with more unstable self-concepts and this may have implications for adapting to changes in one's social environment. Specifically, the primary aim of these studies is to examine the relationship between stability in one's self-concept and the ability to adapt to changes in the social environment.

### *Stability of Self-Concept*

Early studies conceptualized self-concept stability as a major dimension of personality (Brownfain, 1952; Smith, 1958) that has implications for psychological well-being and the quality of interpersonal relationships. Although attempts to clearly define self-concept stability and establish standardized operationalizations posed a challenge to early researchers, studies generally measured self-stability in one of three different ways: by looking at the *discrepancy* between two different definitions of self (i.e., positive self and negative self; Brownfain, 1952); how certain a person was that they possess particular traits (i.e., *syndromatic* measure; Simmons, Rosenberg, & Rosenberg, 1973); and *longitudinal* tests that looked at differences between two or more self-concept tests conducted at different times (Smith, 1958). Chueng (1981) argued that the longitudinal measures were the most consistent with conceptual definitions of self-stability as they highlighted changes in self-concept over time.

### *Self-Esteem Stability*

Contemporary research supports early conceptual definitions of self-concept stability and focuses on changes over time in specific domains such as self-esteem (Kernis, 2005; Webster, Kirkpatrick, Nezlek, Smith, & Paddock, 2007), and affect (Kashdan, Uswatte, Steger, & Julian, 2006; Waston & Walker, 1996; Kaiser & Ozer, 1997) with an emphasis on examining the implications of stability along various dimensions of psychological and interpersonal functioning such as psychological disorders (Kashdan et al., 2006), depression (Franck & Raedt, 2007), close relationships (Kernis, Goldman, & Paradise, 2003), and motivation (Waschull & Kernis, 1996).

The most commonly used measure of self-esteem stability was developed by Kernis, Granneman and Barclay (1989), which generates a stability index by calculating the standard deviation of the individuals' self-esteem scores across multiple assessments (once or twice a day over a 5 to 7 day period). Higher standard deviation scores indicate lower levels of self-esteem stability.

### *Self-Esteem Stability and Self-Esteem Level*

Research indicates that self-esteem stability differs from self-esteem level (i.e., whether one has high or low self-esteem) suggesting that self-esteem stability is a relatively independent dimension of self-concept with an orthogonal degree of predictive power. For example, correlations between self-esteem stability and level of self-esteem tend to be low (e.g., .10 to .30; Kernis & Waschull, 1995). As Kernis and Goldman (2003) point out, self-esteem stability is a measure of variance in self-esteem over time and individual differences in stability and its effects are seen in those with both high and low levels of self-esteem (Kernis & Goldman, 2003). Evidence also indicates unique

predictive power for self-esteem stability that is not associated with self-esteem level.

Several studies have shown, for example, that stability of self-esteem, rather than level of self-esteem, is a more important vulnerability marker for depression (Hayes, Harris, & Carver, 2004; Franck & Raedt, 2007).

Self-esteem level is the most widely investigated self-construct (cf. Vallacher, 2008) and its importance well established. Self-esteem researchers have generally concluded that self-esteem is more complex than whether it is high or low. Many studied distinctions in self-esteem (e.g., implicit vs. explicit [Greenwald & Banaji, 1995]; contingent vs. true [Deci & Ryan, 1995]; and genuine vs. defensive [Schneider & Turkat, 1975]) find that inherent in these distinctions is that self-esteem of the same valence may have a wide range of characteristics and qualities and have a wide range of relations to other psychological constructs (Kernis et al., 2000). Studies also show that the effects of self-esteem stability often emerge after controlling for the effects of self-esteem level. For example, Kernis (2005) reports that the more unstable a person's self-esteem is, the worse they reported feeling in response to negative events and the better they reported feeling in response to positive events and that these effects emerged after controlling for self-esteem. Kernis (2005) also reports that those with unstable self-esteem are more responsive to self-relevant information than those with stable self-esteem and tend to explain negative events in terms of factors that are internal, stable, and global, irrespective of self-esteem level. Although self-esteem level is considered in the studies presented here and is a factor in all three studies, the focus of the studies presented here will be on *stability* of self-esteem and how it is related to one's ability to adapt to changes in the social environment.

### *Benefits of Having Stable Self-Esteem: Empirical Evidence*

A substantive amount of research on self-esteem stability has been done by Kernis and colleagues and others, with studies generally highlighting the functional benefits of stable self-esteem compared to the problems associated with unstable self-esteem (Kernis, 2005; Kernis and Goldman, 2002; Greenier, Kernis, & Waschull, 1995; Seery, Blascovich, Weisbuch, & Vick 2004). Indeed, a wide body of literature suggests that having a stable self-view is advantageous and adaptive in virtually all conditions and situations (Kernis, 2005; Kernis, Paradise, Whitaker, Wheatman, & Goldman, 2000; Seery et al., 2004). Kernis (2005) reports, for example, that compared to those with unstable self-esteem, those with stable self-esteem have more intrinsically generated motivation, are more confident, less vulnerable to depression, aggression, and hostility and have higher levels of life satisfaction. These findings are based on the notion that those with well-anchored feelings of self-worth (i.e., stable self-esteem) are less affected by potentially evaluative events, both positive and negative, than are their less stable counterparts mainly because these events have little or no impact on their self-esteem (Kernis, 2005).

Conversely, instability of self-esteem (i.e., temporal fluctuations in self-esteem) has been associated with higher rates of depression (Roberts & Monroe, 1994; Hayes, Harris, & Carver, 2004; Franck & Raedt, 2007 ), and posttraumatic stress disorder (Kashdan, Uswatte, Steger, & Julian, 2007), as well as a heightened sensitivity to events that have potential relevance to feelings of self-worth as demonstrated through such outcomes as increased concern over one's self-view (Kugle, Clements, & Powell, 1983) and feelings of incompetence or demoralization following failure (Kernis et al., 1998). Furthermore,

Greenier et al. (1995) reported that those with unstable self-esteem tended to interpret an unreturned smile as a reflection of one's own shortcomings and not of the other being preoccupied, an indication that those with unstable self-esteem are more likely to interpret socially ambiguous events as being self-esteem relevant.

Differences in self-esteem stability appear to have implications for self-regulatory processes as well. In a series of studies that tested physiological responses to failure feedback, Seery and colleagues (2004) showed that those with unstable self-esteem tended to respond to failure feedback as a threat, whereas those with stable self-esteem were more likely to view failure feedback as a challenge, a less energy depleting response (Seery et al., 2004). Seery and colleagues argue that those with unstable self-esteem become more physiologically aroused because of an underlying need to defend one's self-worth in the face of self doubt. According to the model used in these studies (i.e., The Biopsychosocial Model of Challenge and Threat; Blascovich & Tomoka, 1996), threat occurs when evaluated demands (danger, uncertainty, effort) outweigh evaluated resources (skills, knowledge, and ability) and challenge occurs when resources meet or exceed demands.

Dienstbier (1989) argued that the physiological responses associated with threat reflect long-term mobilization of energy resources that are appropriate for the possibility of an extended struggle, whereas the physiological effects of a perceived challenge reflect a relatively short-term use of energy reserves appropriate for expectations of success and short-term coping. Compared to long-term activation of energy resources, short-term spikes in energy associated with a challenge response are linked to favorable outcomes,

including better task performance, lower anxiety, and increased immune function (cf. Dienstbier, 1989).

In essence, research indicates that the reactions of those with unstable self-esteem to failure feedback are more long-term and energy depleting than the reactions of those with stable self-esteem, which in turn has reported implications for effective self-regulation (Dienstbier, 1989). Furthermore, Baumeister and colleagues argue that the self expends a limited resource when it engages in acts of self-regulation and have shown along several different dimensions of self-regulation (e.g., regulating thoughts, controlling emotions, inhibiting impulses, sustaining physical stamina, overriding frustration) that the more energy depleted one is, the less likely they are to demonstrate effective self-regulation on a subsequent task. (Baumeister, Heatherton, & Tice, 1993; Muraven and Baumeister, 2000; Schmeichel, Vohs, & Baumeister, 2003). These findings support an abundant literature that generally purports the functional benefits of stable self-esteem compared to the liabilities of unstable self-esteem.

#### *Limitations of Self-Stability: Empirical Evidence*

Although research suggests that there are clear advantages to having a stable self-esteem and that self-esteem stability is an important component for self-regulation, other lines of research suggest that too much stability in one's self-concept might have some disadvantages, especially in relation to adapting to a changing social environment. Gergen (1968), for example, demonstrated an early recognition of a possible downside to having a stable self-concept when he argued that too much consistency in self-identities is unnatural and can be detrimental to one's interactions with others, mainly because it does not allow one to make the necessary adjustments when dealing with the demands of

different people and groups. Gergen took issue with the assumption of personal consistency that had become quite prevalent in personality and social influence research, and proposed instead that a more natural state is one which includes numerous disparities and contradicting tendencies. Personal inconsistency, Gergen argued, does not necessarily mean that people are simply displaying chameleon-like behaviors in their interactions with others. Rather, he argues, it sheds light on the immense human capacity for rich and varied social behavior (Gergen, 1968).

This dynamical view of self and its implications for social interaction were later supported by Markus and Kunda (1986) who purport that the malleable and dynamic properties of the self derive primarily from the self's social nature and are important for interpersonal functioning. They argued that one's overall self-concept is made up of a wide variety of self-conceptions (e.g., good self, bad self, possible self, not-me self, etc.) and that one's self-concept at any given moment (i.e., the "working self") is an activated subset of the larger whole and is a temporary structure that is subject to change. Their research findings support the idea that people tend to adjust and calibrate their self-concepts in response changes in internal (e.g., mood states) and external (e.g., performance feedback) self-knowledge information and that malleability in self-concept is a necessary component for social adjustment.

Adjusting self-concept in response to changes in the social environment is also an important tenet of sociometer theory (Leary, Tambor, Terdal, & Downs, 1995), a theory that provides further support for a possible downside to stable self-esteem. Leary and colleagues present evidence of self-esteem as a "sociometer" that is designed to detect changes in one's inclusionary status and purport that changes in self-esteem resulting



from perceived exclusion provide the motivation for people to behave in ways that serve to reestablish or maintain connections with others. The idea of a sociometer suggests that the adaptive function of self-esteem is not to maintain stability in one's subjective feelings of self-worth, but rather to monitor social feedback in order to adjust and change one's behavior in response to potential threats to one's inclusionary status.

The tenets of sociometer theory suggest that highly stable self-esteem would likely impede the motivation to change one's behavior toward maintaining connections with others should one's inclusionary status come under threat. Because social acceptance and maintaining interpersonal connections is critically important to psychological well-being (Baumeister and Leary, 1995), being able to recognize and respond appropriately to changes in social standing is also of critical importance (Leary et al., 1995). Indeed, Leary and colleagues (2003) demonstrated that people's self-esteem is quite sensitive to social approval and disapproval even when they claim that how others regard them does not affect how they feel about themselves (Leary, et al., 2003). Furthermore, Leary argues that a pervasive failure to experience changes in self-esteem in response to changes in one's standing with others can be maladaptive (Leary, 1999).

#### *A Dynamical View of Self-Concept Stability*

The impetus to examine a possible downside to having a stable self-concept comes from dynamical systems literature, which shows that high levels of stability in a dynamical system are associated with a loss of complexity that limits a systems range of possible behaviors (Vallacher & Nowak, 1994; Nowak & Vallacher, 1998; Losada, 1999).

From a dynamical systems point of view, a stable self-view can be represented as a fixed-point attractor (Nowak & Vallacher, 1998) and is similar in concept to the principle of homeostasis. In terms of self-evaluation, evaluative consistency provides an “attractor” for organizing judgments of social objects, including the self. Evaluation allows people to form higher order structures for the myriad, and often disparate, bits and pieces of self-relevant information encountered everyday (Vallacher & Nowak, 2000). Although thoughts about helping a friend move, for example, and resisting the urge to overeat are disparate in their content, the evaluative value for both is similarly positive.

This integration of low-level elements into higher order identities allows for an evaluatively consistent sense of self (Vallacher & Wegner, 1989). A fixed-point attractor reflects a system state that has converged on a stable value (Vallacher & Nowak, 2007) and, like homeostasis, generally involves the maintenance of a particular state that tends to be resistant to internal and external perturbations (e.g., stresses or influences). Specifically, the stronger (i.e., more stable) the attractor is, the more likely the system is to stay in that particular state (Nowak, Vallacher, and Zochowski, 2005).

From an attractor dynamics point of view, a stable self-view is a system with a strong attractor that is minimally influenced by forces that are brought to bear upon it. For example, someone with stable self-esteem might be temporarily affected by evaluative feedback that does not match their own feelings of self-worth, but these effects would be rather minimal as the system would quickly return to its original stable state. In a highly stable self-system, even important self-contradictory information would tend to have little or no lasting effect on one’s stable self-view (Vallacher, Nowak, Froehlich, & Rockloff, 2002), and would therefore provide little if any impetus to change one’s thoughts or

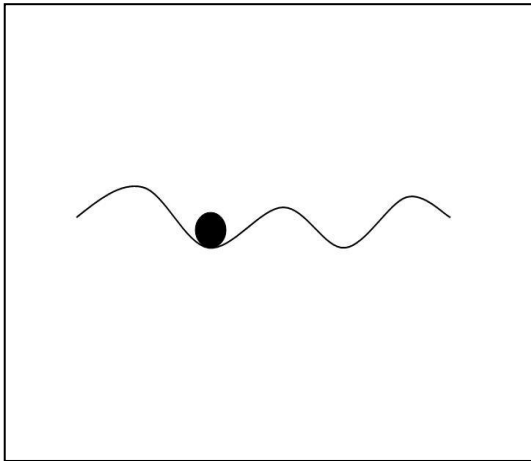
behaviors, a circumstance that may have negative implications for social interaction (Leary, 1999).

A highly unstable self-view, in contrast, is represented as a system with weak attractors or no attractors at all. Under these conditions, any internal or external influence, trivial or important, would further disrupt the already unstable state of the system. This means that someone with an unstable self-view would tend to be highly reactive to incoming evaluative information, whether positive or negative, as they would not be able to sustain any particular state for any length of time and would have no attractor to return to after their already unstable self-view is perturbed.

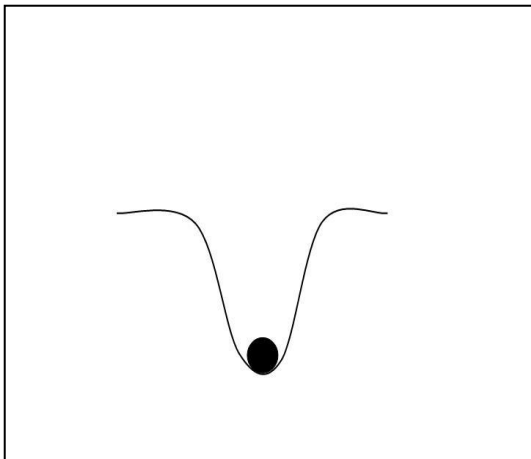
Figure 1 and Figure 2 illustrate the ball and landscape metaphor widely used in dynamical systems theory to describe attractor states (e.g., Coleman, Vallacher, Nowak, & Bui-Wrzosinska, 2007; Vallacher & Nowak, 2007) and gives a visual depiction of how perturbations in the system can affect unstable and stable attractor states. Both stable and unstable attractors have a basin of attraction, which represents its sphere of influence. The wider the basin of attraction, the wider its sphere of influence, and the more elements (e.g., thoughts, feelings, beliefs) in the system that will evolve toward that attractor.

The depth of the attractor represents its strength. Hence, for a deep, stable attractor, once an element is in its sphere, it is difficult to dislodge it even when the influence or perturbations are strong. In contrast, elements in an unstable attractor can be relatively easily dislodged with minimal perturbation.

*Figure 1: Unstable Attractor*



*Figure 2: Stable Attractor*



The negative implications of highly unstable self-systems are evident in research in depression and suicidal ideation (Johnson & Nowak, 2002), and, in other clinical samples, diseases such as borderline personality disorder and schizophrenia are characterized by extremely unstable affective and cognitive processes (Johnson & Nowak, 2002; Koenigsberg, et al., 2002; Wexler, Nicholls, & Bell, 2004). For example, Johnson and Nowak (2002) showed that a highly unstable self-view in those with bipolar depression can be a dangerous predictor of suicidal tendencies, suggesting that it is, in fact, more desirable to have a stable negative self-view than a highly unstable (positive or negative) self-view (Johnson and Nowak, 2002). Koenigsberg et al. (2002) showed that compared to patients with other personality disorders (e.g., paranoid, histrionic, antisocial), those with borderline personality disorder show significantly higher rates of affective instability and negative ideation; and studies conducted by Wexler and colleagues (2004) indicate that functional variability in cognitive processes is an important and consistent characteristic of schizophrenia (Wexler et al., 2004).

In contrast to stable and unstable attractor systems, a malleable or self-adjusting self-view can be conceptualized as a system with multiple attractors, representing a wider range of sustainable states. The notion of multiple sustainable states in a system is similar to the concept of allostasis (as opposed to homeostasis). Allostasis is a term that refers to the dynamic conditions under which physiological systems typically operate, and describes the operating range of healthy systems as the ability to increase or decrease vital functions in response to changing demands (Sterling and Eyer, 1988, cf. Giardino, Lehrer, & Feldman, 2000). Therefore, a system with multiple sustainable states typically responds to strong influences or stresses on the system by moving toward entirely

different equilibrium states as current states are relinquished in favor of more adaptive states (Nowak & Vallacher, 1998). A change in the system would therefore be reflective of the strength and importance of the change-inducing influence. For example, if a person has a range of attractors for qualitatively differing self-evaluative states, relatively important, self-contradictory evaluative feedback would push the self-system into an attractor that is consistent with the contradictory feedback, consequently bringing about a change in one's thoughts or behaviors. Changes in thought and behavior however would be unlikely if one has a highly stable self-evaluative attractor. Under these conditions, even relatively important self-evaluative feedback that contradicts one's self-view would have little or no affect on one's overall self-view and there would therefore be little if any reason to make adjustments in thought or behavior.

Studies indicate that system stability has implications for non-clinical populations as well. For example, research based on dynamical systems theory shows that stability is linked to decrements in group performance. Losada (1999) examined differences in the dynamics of low, medium, and high performance teams as groups of eight team members interacted with each other. The speech of team members was coded on the dimensions of inquiry/advocacy (e.g., inquiry if questions were aimed at exploring and examining a position; advocacy if speech involved arguing in favor of the speakers position); and other/self (e.g., other if reference was to a group outside the lab, self if reference was to oneself or those in the lab). Losada expected high performance teams to be balanced on both of these dimensions. Positivity/negativity of speech was also coded (e.g. positive if it indicated support, encouragement, or appreciation; negative for disapproval, sarcasm, or cynicism; Losada, 1999). From the positivity to negativity ratio, Losada created

“emotional space” as a factor. High ratios indicate expansive emotional space and low ratios indicate restrictive emotional space. It was expected that high performance teams would create expansive emotional spaces.

Results from time-series analysis of high performance teams showed complex patterns of interaction emerging from group interconnectivity and positivity. In contrast, the dynamics of low performance teams were much simpler and tended toward stable, fixed point attractors, a reflection of the team’s restrictive interactions created by negativity and a lack of support for one another. According to Losada, dynamic interconnectivity among team members leads to the learning, adaptation, and innovation often observed in high performance teams. Conversely, interactions among low performance team members tend to be restrictive and highly stable making it difficult for team members to connect with one another or change their pattern of interacting, the result of which is distrust, cynicism, and a lack of enthusiasm, creativity, and innovation (Losada, 1999).

The figures below, taken from Losada’s (1999) article, provide a visual depiction of the difference in team member interaction dynamics for high and low performance teams (Losada, 1999, p. 185, 186). Figure 3 shows the dynamics of high performance teams on the dimensions of emotional space and inquiry/advocacy. In contrast, Figure 4 shows the restrictive interaction pattern of low performance teams.

Figure 3: Interaction pattern of high performance teams

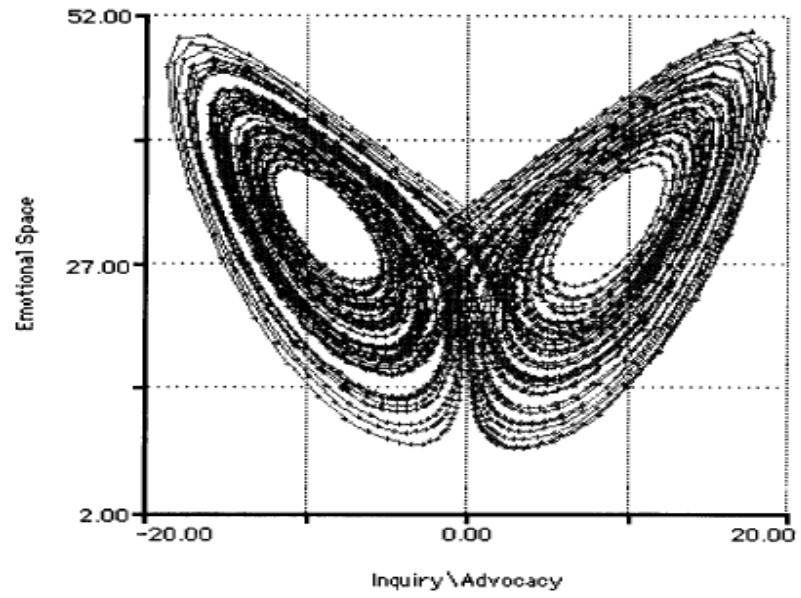
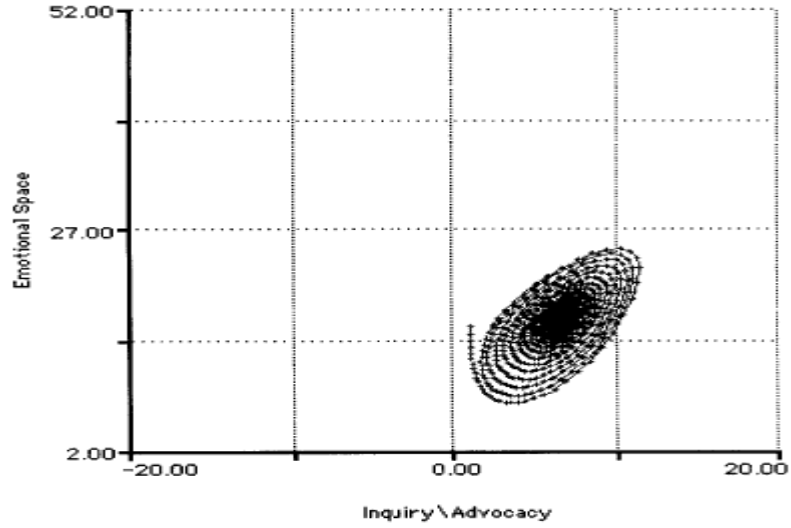


Figure 4: Interaction pattern of low performance teams





These results indicate that compared to high performance team members, the members of low performance teams have a stable and restricted pattern of interaction, which limits group's range of behaviors and the expansiveness and flexibility needed for adaptation and innovation (Losada, 1999).

Also supporting the idea that there is a downside to stability are studies in biological systems showing that increased stability in the system can be a precursor for pathology. Studies on cardiovascular systems, for example, show that the heart rates of healthy individuals are far from stable and that even over brief periods of time, healthy heart rates exhibit highly complex patterns of variability, a crucial component in the system's ability to adjust to changing biological and environmental demands. In fact, a decline in the variability of heart rate is a reliable indicator of cardiac disease and even sudden cardiac death. Studies show that many healthy biological systems (e.g., cardiovascular, immune, neuroendocrine) generally exhibit high levels of variability while illness is often reliably indicated by a sudden stabilizing tendency in the system (Giardino et al., 2000).

Research also indicates that for certain psychological processes variability (as opposed to stability) is a sign of a healthy system. Gottschalk and colleagues (1995), for example, showed that when the daily mood ratings of those with bipolar disorder were compared to the ratings of normal controls over the course of a year, bipolars tended to show a well-defined cycling in mood, indicating that their overall pattern of mood changes were more stable than normal controls. In essence, the moods of the bipolar participants were more predictable than healthy controls indicating that healthy individuals tend to exhibit more variability in mood over time than their less healthy counterparts (Gottschalk, Bauer, and Whybrow, 1995).

Given the weight of the evidence just described, there appears to be some support for the idea that stability in a dynamical system such as the self is not always advantageous and that under some circumstances, it can in fact be detrimental to adaptive functioning. Specifically, dynamical systems theory supports that notion that too much stability in the self-system may limit the systems range of behaviors, especially in relation to the self-system's ability to respond to changing social demands. Accordingly, in the studies that follow, it is predicted that those with higher levels of self-esteem stability will show lower levels of socially-oriented flexibility. However, an explanation regarding the factors associated with the way people respond to their social environment and how this has been operationalized in previous studies is warranted.

### **Social Response Theories**

How people respond to their social environment is a deeply complex topic that involves, among other things, cognitive and affective, as well as controlled and automatic processes. Furthermore, these processes involve a myriad of interacting biological and environmental factors that contribute to outcomes on both the intra- and interpersonal level (e.g., Bjorklund, 2007). The social nature of human beings and the idea that people respond differently to different social situations has been emphasized in studies that indicate there are individual differences in interpersonal flexibility and in the tenets of social facilitation and dominant response theory. A brief consideration of these theories and how they relate to the present series of studies is given below.

#### *Individual Differences in Interpersonal Flexibility*

Most of the research on interpersonal flexibility, which includes both cognitive and behavioral dimensions of flexibility, has been done in the management, leadership, and

organizational literature. According to previous studies, *behavioral flexibility* is demonstrated when people are both willing and able to employ different (and appropriate) social responses in different social contexts (Bass, 1990; Zaccaro, Gilbert, Thor, & Mumford, 1991; Hall, Workman, & Marchioro, 1998). This definition clearly incorporates the social aspects of behavioral flexibility by conceptualizing behavioral flexibility as the ability to match behavior with situational demands.

Previous research has indicated that behavioral flexibility assesses two components, namely, the range of a person's behavioral repertoire and their ability to adjust to changing situational demands (Paulhus & Martin, 1987; Hall et al., 1998). The implication is that people with behavioral flexibility have the social knowledge and perceptiveness to match their behaviors to situational demands that are both positive and negative in nature (Hall et al., 1998), indicating high variability of behavior across different situations. Greater behavioral flexibility has been previously linked to leadership emergence (Hall et al., 1998), cross-cultural adaptability (Harrison, Chadwick, & Scales, 1996), a greater ability to express and evoke positive affect (Levine and Feldman, 1997) and to perform situationally appropriate behaviors in a wide variety of interpersonal situations (Paulhus and Martin, 1987).

To assess behavioral flexibility, **Study 1** uses the short version of the Battery of Interpersonal Capabilities (BIC; Paulhus & Martin, 1987) which assesses the participants range of interpersonal capabilities (e.g., How likely is it that you could be dominant if the situation requires it? agreeable?, calculating?, hostile?, etc.). A wider range of capabilities indicates behavioral flexibility and the ability to adapt to a wide variety of interpersonal situations. In **Study 2**, a measure of behavioral flexibility is used that poses several

different social scenarios and behavioral responses to the participant (e.g., You are invited to give a speech about the university at a city council meeting. Everything seems fine at first, but then fifteen minutes into the speech, several members of the audience start talking to each other. You quickly end the speech and thank the group for their time.), and asks them to rate how much their own behavior would be like that described in the scenario (Paulhus & Martin, 1987).

Previous research in *cognitive flexibility* also emphasizes its social aspects and focuses on measures of cognitive flexibility considered necessary for effective communication, or, what Martin and Rubin (1995) refer to as communication competence. Cognitive flexibility is associated with interpersonal communication competence and has been shown to be correlated with communication responsiveness and assertiveness (Martin & Anderson, 1998). Furthermore, studies indicate that individuals with higher levels of cognitive flexibility tend to be more successful in achieving goals and more cognitively aware of behavioral choices when they experience changes in social circumstances (Martin & Anderson, 1998).

The Cognitive Flexibility Scale (CFS) used in **Study 1 and Study 2** is a well-validated measure (Martin & Rubin, 1995) that assesses three areas of cognitive flexibility: awareness of communication alternatives (e.g., I can communicate an idea in many different ways); willingness to adapt to the situation (e.g., I am willing to listen and consider alternatives for handling a problem) and self-efficacy for handling a problem (e.g., I can find workable solutions to a seemingly unsolvable problem).

### *Social Facilitation and Dominant Response Theory*

Social facilitation theory argues that the presence of others has an effect on human performance. Specifically, it posits that performance on a particular task is enhanced by the presence of other people. Triplett's (1898) observation of cyclists getting faster speed times when they were competing rather than not competing stimulated much interest in research on the effects of social presence on behavior. Building on the findings of this early research, later studies (e.g., Gates, 1924, cf. Gilovitch, Keltner, & Nisbett, 2006; Dashiell, 1935, cf. Uziel, 2006) showed that just the "mere presence" of passive observers (as opposed to co-actors) affects behavior. Although most of the findings consistently supported the social facilitation effect, there were some studies that did not. Other studies, for example, showed that the presence of others inhibited performance on tasks such as refuting a philosophical argument (Allport, 1920); and performance on arithmetic problems (Dashiell, 1930), memory tasks (Pessin, 1933), and maze learning (Pessin & Husband, 1933, cf. Gilovitch, et al., 2006).

An explanation of this discrepancy in the research was later presented by Zajonc (1965) when it was demonstrated that the presence of others improves performance on simple or well-learned tasks and hinders performance on complex or unfamiliar tasks. According to Zajonc's (1965) dominant response theory, the process underlying this effect is arousal. Zajonc posited that the mere presence of others induces arousal and this arousal tends to facilitate dominant or habitual responses. For well-learned or easy tasks, the dominant response is usually correct. For difficult or unfamiliar tasks, however, one's dominant response is usually not correct, thus, decrements in performance are seen with difficult tasks when others are present.

As a measure of behavioral flexibility, **Study 3** examines the effects of self-esteem stability on participants' willingness to switch from a dominant or habitual response to a nondominant (or non habitual) response in a stress or no stress condition. Hypotheses for **Study 3** are based on attractor theory derived from dynamical systems principles and dominant response theory.

#### *Evaluation Apprehension*

A central tenet that emerged from the social facilitation literature is the notion that audience presence induces anxiety. Disputing the idea that it is the mere presence of others that increases arousal, studies based on evaluation apprehension theory demonstrated that it is evaluation apprehension, or the possibility of looking bad in the eyes of others, that underlies arousal in the presence of others (Cottrell, Wack, Sekerak, & Rittle, 1968; Seta & Seta, 1992) and that social presence is only a factor when one is expecting to be evaluated by others (cf. Uziel, 2006). Cottrell et al. (1968), for example, demonstrated that a significantly higher number of dominant responses (i.e., reciting well-learned nonsense words as opposed to not very well learned nonsense words) were made by participants who were being watched by an attentive audience (i.e., an audience who could evaluate their performance) than if they were next to a mere presence audience (i.e., blindfolded audience) or if they were alone. There was no significant difference in response type between the mere presence and alone groups.

Contemporary studies in evaluation apprehension also support earlier studies showing that evaluation apprehension induces arousal. Seta and Seta (1992), for example, looked at participants' baseline anxiety (i.e., mean arterial blood pressure [MAP]) and then examined MAP after participants' performed in front of an audience. Their results

showed some variations in anxiety level due to the make up of the audience (e.g., high vs. low status; heterogeneous vs. homogeneous), however, audience evaluation induced higher anxiety levels than baseline across contexts demonstrating that evaluation concerns are positively associated with anxiety levels (Seta & Seta, 1992). Furthermore, Hughes' (2007) study examining cardiovascular responses to evaluative feedback showed that although there are differences in levels of response depending on whether the feedback is positive or negative, all feedback levels (i.e., positive, negative, and neutral), showed heightened levels of arousal through measures of cardiovascular activity. In **Study 3**, participants are randomly assigned to a stress or no stress condition. Stress is operationalized as evaluation apprehension.

#### *The Present Research*

This series of studies tests the overarching hypothesis that compared to those with less stable self-views, those with stable self-views will demonstrate lower levels of flexibility of behavior in response to changing social demands. Three studies are presented, each one building upon the previous.

In Study 1, stability of self-view was assessed using the mouse procedure paradigm (Vallacher & Nowak, 1994) which, for the purposes of this study, assessed changes in self-evaluation over time (i.e., up to 5 minutes). In addition, participants were asked to complete self-report questionnaires regarding their flexibility along both behavioral (i.e., BIC; Battery of Interpersonal Capabilities scale [Paulhus & Martin, 1987]) and cognitive (i.e., Cognitive Flexibility Scale [Martin & Rubin, 1995]) dimensions. The purpose of Study 1 was to establish that there is a relationship between stability of self-view and one's reported levels of behavioral and cognitive flexibility. In Study 1, the

operationalization of stability of self-view was consistent with a dynamical definition of self-esteem stability as changes in self-evaluation over time and was captured in the dynamical measure of stability (i.e., mouse procedure) of changes in velocity of movement over time (up to 5 minutes). It was predicted that those with higher levels of self-evaluative stability would report lower scores on the behavioral and cognitive flexibility assessments.

The purpose of Study 2 was to validate and expand on the results of Study 1. To do this, a widely used and well-validated dynamic measure of self-esteem stability developed by Kernis et al. (1989) was used. Kernis defines self-esteem stability as the “magnitude of short-term fluctuations that people experience in their contextually based, immediate feelings of self-worth” (Kernis, 2005, p. 4). This measure captures the magnitude of fluctuations in self-esteem over a period of several days (usually five). In Study 2, the original mouse procedure used in Study 1 was replaced with a modified version of the original mouse procedure, the linear mouse procedure. Similar to the original mouse procedure, the linear mouse procedure assesses the dynamics of participants’ self-evaluations over time (up to 5 minutes), however, the positivity and negativity of evaluations are assessed on a linear, one dimensional scale as opposed to the two dimensional scale of the original mouse procedure. Also, the linear mouse has visual anchor points for degrees of positivity and negativity, providing participants with a frame of reference.

Another difference between Study 1 and Study 2 is that the measure of behavioral flexibility used in Study 1 (BIC; Battery of Interpersonal Capabilities scale) was replaced with a different behavioral flexibility measure (Communication Flexibility Scale [Martin



& Rubin, 1994]), which assesses a person's ability to adapt their behavior from situation to situation as well as within situations, a dimension of behavioral flexibility that was not assessed in Study 1. It is predicted that Study 2 will expand on and validate the results of Study 1 and show that those with higher levels of self-esteem stability will score lower on measures of behavioral and cognitive flexibility.

The aim of Study 3 is two fold. This study examines the relationship between self-esteem stability and behavioral flexibility by looking at one's willingness to be flexible in an actual situation (as opposed to self-report measures of flexibility used in Study 1 and 2). Behavioral flexibility has been defined as the ability to adjust behavior to changing social demands (Hall et al., 1998). Consistent with this definition, we will examine behavioral flexibility by assessing how willing the participant is to switch from a dominant (habitual) response role (e.g. extravert if scored as extravert on EPQ and introvert if scored as introvert on EPQ) to a non dominant (non habitual) response (e.g. introvert if scored as extravert on EPQ and extravert if scored as introvert on EPQ) in a supposed role-playing task. A higher level of willingness to switch from a dominant to a nondominant response role is indicative of higher levels of behavioral flexibility.

Study 3 also examines how the relationship between stability and behavioral flexibility is affected by stress. Social situations can at times be stressful and examining how stress affects the relationship between self-esteem stability and behavioral flexibility is an important question. Predictions for Study 3 are derived from a dynamical perspective that views stress as an agent that perturbs a self-system. It is therefore expected that stress will have an amplifying effect on the relationship between self-esteem stability and behavioral flexibility.

Hypotheses for Study 3 are: 1) those with stable self-esteem should be less willing than those with unstable self-esteem to switch to a non dominant role (i.e., will show lower levels of behavioral flexibility) in the no stress condition; this supports the results from Studies 1 and 2; 2) it is expected that stress will amplify the effect of self-esteem stability such that those with high levels of self-esteem stability will show lower flexibility in the stress condition than in the no stress condition. This hypothesis supports the idea that when stress perturbs the system it decreases the potential for nondominant responses and therefore one's dominant response becomes the most likely response; and, also supporting an amplifying effect of stress, 3) participants with lower levels of self-esteem stability will show higher levels of behavioral flexibility in the stress condition than in the no stress condition. This hypothesis supports the idea that unstable self-views are further weakened by stress, thereby further attenuating an already weak dominant response and giving rise to higher levels of flexibility in behavior under conditions of stress.

### **Study 1: Stability of Self-View and Behavioral and Cognitive Flexibility**

Dynamical systems theory posits that as a system becomes more stable, the range of the systems behavior becomes more limited and less complex (Vallacher & Nowak, 1994; Nowak & Vallacher, 1998). The bulk of the current research on stability of self-view clearly demonstrates the benefits of having a stable self-view, especially in terms of self-regulation and warding off the onset of depression and psychological disorders (Seery et al., 2004; Kernis, 2005, Johnson & Nowak, 2002). However, because the self-structure is a dynamic psychological system, the price for stability in one's self-view may

be a decrease in the complexity and range of a person's behaviors. To test this idea, the purpose of Study 1 was to establish that there is a relationship between stability of self-view and one's reported levels of behavioral and cognitive flexibility. To do this, dynamical (Vallacher & Nowak, 1994) and self-report measures (Campbell, et al., 1996; Rosenberg, 1986) of stability were used to examine the relationship between stability of self-view and flexibility in the self system. It was hypothesized simply that those who exhibit more stability (less variability) in their self-evaluations would report lower levels of cognitive and behavioral flexibility, supporting the notion that there may be a potential cost in having a stable self-view.

## Method

### *Participants*

Participants were 121 undergraduate students (79 women, 42 men; mean age of 18.83) who received research credit for participation. Participants arrived at their scheduled testing session and were asked to complete a series of online questionnaires and measures assessing behavioral flexibility, cognitive flexibility, self-esteem level, self-stability, and other personality factors. Participants were tested individually with testing times lasting up to 1 hour.

### *Materials and Procedure*

After arriving at the testing session, participants were asked to complete a series of questionnaires (Rosenberg Self-esteem Questionnaire; Self-monitoring Scale; Self-concept Clarity Scale; Rosenberg Stability Items; Behavior Identification Form; Locus of Control; Need for Closure; Cognitive Flexibility Scale; Behavioral Flexibility Scale;) and record and evaluate an up to 5 minute self-descriptive recording.

*Self-Esteem Level.* (Rosenberg, 1965): this is a well-validated measure of feelings of self-worth (e.g., I feel that I'm a person of worth, at least on equal plane with others). Responses are based on how much participants generally agree with each of the 10-items on a 4-point strongly agree to strongly disagree scale. Higher scores indicate higher self-esteem.

*Self-Monitoring Scale* (Lennox & Wolfe, 1984): this is a 13-item scale with 2 subscales (Ability to modify self-presentation – items 1, 3, 7, 9, 10, 12, 13; e.g., In social situations, I have the ability to alter my behavior if I feel that something else is called for); and sensitivity to expressive behavior of others – items 2, 4, 5, 6, 8, 11; e.g., I am often able to read people's true emotions correctly through their eyes). Responses were made on a 6-point Likert-type scale (0= certainly, always false; 5= certainly, always true). After reverse scoring (items 9, 12) items are summed with high scores indicating high self-monitoring.

*The Self-Concept Clarity scale* (SCC; Campbell, 1996): measures the extent to which self-beliefs are clearly defined, internally consistent, and temporally stable (e.g., My beliefs about myself often conflict with one another). Responses to the 12 items are rated on a 5-point strongly disagree to strongly agree scale. After reverse scoring, item responses are summed. Higher scores indicate greater self-concept clarity.

*Self-Stability:* assessed using four stability items included in the Rosenberg (1965) Self-Esteem Scale (e.g., My opinion of myself tends to change a good deal). Higher scores on the stability items indicate greater self-stability.

*Behavior Identification Form* (Vallacher & Wegner, 1989): this is a 25-item measure, which gives participants a choice between a high or low level action identification (e.g.

Reading: following lines of print (Low) or gaining knowledge (High). The total score is the sum of higher level choices.

*Locus of Control Scale* (LOC; Rotter, 1966), a 29-item measure evaluating participants' perceptions about whether life events are controlled by the individual (internal) or by external forces outside of one's control (e.g., Many of the unhappy things in people's lives are partly due to bad luck [external] vs. people's misfortunes result from the mistakes they make [internal]). Total score is the sum of external control alternatives.

*Need for Closure scale* (Webster & Kruglanski, 1994): assesses the participants desire for firm answers and their aversion to ambiguity (e.g., I think that having clear rules and order at work is essential for success). The Need for Closure scale contains 47 items that are rated on a 6-point (1) strongly disagree to (6) strongly agree scale. High scores reflect a greater need for cognitive closure, indicating less cognitive flexibility.

*Cognitive Flexibility Scale*: (Martin & Rubin, 1995) is a 12-item scale that assesses the a person's awareness that in any given situation there are options and alternatives available, their willingness to be flexible and adapt to the situation, and their level of self-efficacy in being flexible. Items (e.g., I can communicate an idea in many different ways; I seldom have choices when deciding how to behave [reversed]) are rated on a 1 to 6 strongly disagree to strongly agree scale with higher scores indicating higher levels of cognitive flexibility (please see Appendix A).

*Battery of Interpersonal Capabilities* (BIC; Paulhus & Martin, 1987: measures behavioral flexibility by assessing participants' range of interpersonal capabilities (e.g., How likely is it that you could be dominant if the situation requires it? How

likely...agreeable, calculating, hostile, etc.). Higher scores indicate a wider range of behavioral capabilities (please see Appendix B).

### *Mouse Procedure Paradigm*

Next, participants completed the mouse procedure by recording an up to 5-minute self description. They were then instructed on using a computer mouse pointer to indicate the valence (e.g. positivity and negativity) of their self descriptions while listening to their self description played back through headphones (please see Appendix C for mouse procedure instructions and Appendix D for self-recording instructions).

### Results

A stability index was calculated by looking at the velocity of mouse movements over time and subtracting mean velocity in Time 2 from the mean velocity of Time 1. If this number was negative, indicating an increase in velocity over time, participant was categorized as “unstable” ( $n=23$ ). If this number was positive, indicating a decrease in velocity over time (i.e., a stabilizing tendency), participant was categorized as “stable” ( $n=98$ ).

Using changes in velocity of mouse movements over time as a measure of stability and controlling for self-esteem, results indicated that participants with a relatively stable self-evaluation (i.e., stable group) scored significantly lower on cognitive flexibility ( $M=56.13$ ;  $SD= 5.20$ ) than those who demonstrated less stability (i.e. unstable group) in their self-evaluations ( $M=58.43$ ;  $SD= 4.51$ );  $F(1, 117)=5.79$ ;  $p < .05$ ;  $d=.36$ ). A similar pattern of results was found between the stable and unstable groups on behavioral flexibility, however results were not significant. Self-report measures of stability

(Rosenberg, 1986; Campbell et al., 1996) found no significant differences between the stable and unstable groups on measures of behavioral and cognitive flexibility.

Correlational Analyses

A correlational analysis was conducted to examine relationships between the scales used in this study (i.e., Rosenberg Self-esteem Questionnaire; Self-monitoring Scale; Self-concept Clarity Scale; Rosenberg Stability Items; Behavior Identification Form, Locus of Control, Need for Closure, Cognitive Flexibility Scale; Behavioral Flexibility Scale). Table 1.1 displays results of correlations and reliability indexes (please see Appendix E for score ranges, means, standard deviations, and *N* for each scale).

*Table 1.1. Study 1 scale correlation and reliability indexes*

	1	2	3	4	5	6	7	8	9
1. SE	(.89)								
2. SM	.16	(.77)							
3. SCC	.64***	.12	(.86)						
4. STAB	.57**	.13	.76***	-					
5. ActID	.12	.26**	.01	-.04	-				
6. LOC	-.30**	.003	-.15	-.13	-.15	-			
7. NFC	.09	.15	-.01	-.05	.03	-.11	(.79)		
8. CF	.57***	.37**	.36**	.28**	.24**	-.26	-.009	(.71)	
9. BF	.10	.27**	-.03	-.09	.02	-.09	-.12	.22**	(.79)

*Note:* SE=Self-esteem level; SM= Self-Monitoring; SCC=Self-concept clarity, STAB= Stability Items; ActID= Behavior Identification Form; LOC= Locus of Control (higher scores=higher external LOC; NFC= Need for Closure; CF= Cognitive Flexibility; BF= Behavioral Flexibility. Reliability indexes (Cronbach’s alpha) are reported in parentheses.

\*= $p < .05$ , \*\*= $p < .01$ , \*\*\*= $p < .001$ .

The above correlations primarily indicate expected relationships between personality factors and cognitive and behavioral flexibility. Cognitive Flexibility was significantly correlated with self-esteem level,  $r(121) = .57, p < .001$ ; self-monitoring,  $r(120) = .37, p < .001$ ; self-concept clarity,  $r(121) = .36, p < .001$ ; stability,  $r(121) = .27, p < .01$ ; action identification,  $r(121) = .24, p < .01$ ; locus of control,  $r(121) = -.26, p < .01$ ; and behavioral flexibility,  $r(121) = .22, p < .01$  such that higher scores on cognitive flexibility are

associated with higher self-esteem, higher levels of self-monitoring, more self-concept clarity and stability, higher level action identification, an internal locus of control, and higher levels behavioral flexibility. Behavioral flexibility, which assessed the participants range of behavior, was associated with higher levels of self-monitoring,  $r(120) = .27$ ,  $p < .01$ . It's interesting to note however that need for closure showed no significant correlation with any other scales and behavioral flexibility was correlated with self-monitoring and cognitive flexibility, but not with self-esteem level or stability. Self-concept clarity was highly correlated with the Rosenberg stability items,  $r(121) = .76$ ,  $p < .001$ , which was expected as one of the dimensions that self-concept clarity taps into is self-concept stability. It is also interesting to note that high self-esteem is associated with cognitive flexibility but not behavioral flexibility. Study 1 statistical analysis was a collaborative effort with Ula Strawinska.

### *Discussion*

The results of this study supported the hypothesis that those with more stable self-evaluations would report lower scores on behavioral and cognitive flexibility. Although the results of this study are not conclusive, they do provide support for the idea that high levels of self-stability may not be advantageous in all situations and the possibility that too much stability might hinder adaptation to change in one's social environment. The results from Study 1 also provided the incentive to continue with line of research and highlight the importance of measuring stability of self-view using dynamical measures that capture changes in self-view over time. The dynamical measure of stability used in this study (i.e. velocity of mouse movement over time) is not widely used and has not



been validated as a self-concept stability measure. For Study 2, in addition to the mouse procedure, a well-validated measure of self-esteem stability is used.

### **Study 2: Self-Esteem Stability and Behavioral and Cognitive Flexibility**

The purpose of Study 2 is to validate and expand on Study 1, which found that those with higher levels of self-evaluative stability tended to score lower on cognitive flexibility than those with lower levels of self-evaluative stability. Study 2 focused on a widely studied area of self-stability, self-esteem stability in particular, and tests whether the results using a well-validated measure of self-esteem stability (Kernis, et al., 1989) will support the results found in Study 1. Although the trend for behavioral flexibility and self-evaluative stability was in the predicted direction in Study 1, measuring behavioral flexibility as the range of participants' behavioral repertoire taps into one particular dimension of the construct. Study 2 uses a measure of behavioral flexibility that assesses another aspect of flexibility, how flexible the participant is willing to be in different social scenarios. Although participants' reported range of behavior is a valid measure of behavioral flexibility (Paulhus & Martin, 1987) the measure used in Study 2 expands on the definition for behavioral flexibility used in Study 1 (Martin & Rubin, 1994). In addition to assessing self-esteem stability, Study 2 utilizes a modified version of the original mouse procedure used in Study 1 to assess self-concept dynamism and examine its relationship to self-esteem stability and behavioral and cognitive flexibility. It is expected that those with unstable self-esteem will show higher levels of self-concept stability.

It is predicted that the results of Study 2 will support and expand on the findings in Study 1 by showing that those with higher levels of self-esteem stability will score lower on measures of behavioral and cognitive flexibility.

## Method

### *Participants*

This study consisted of 52 participants (27 women, 25 men) who ranged in age from 18 to 32 ( $M= 19.15$ ,  $SD=2.02$ ). Participants were given course credit for research participation. The sample was representative of an ethnically diverse university student population (i.e., Caucasian 48%; Hispanic 29%; African American 19%; Asian and other 4%).

### *Materials and Procedure*

Participants were told the study was testing personality differences in a college student sample. This study took place in two sessions.

**Session 1:** Participants completed a series of online assessments including impulsivity, global self-esteem, personal need for structure, self-concept clarity, behavioral flexibility, and cognitive flexibility. Participants were then asked to record an up to 5 minute self-description and then evaluated their own self-descriptions in terms of positivity and negativity using the linear mouse procedure.

*Barratt Impulsiveness Scale* (Patton, Stanford, & Barratt, 1995) is a 30-item measure that assesses impulsivity (e.g., I act “on impulse”; I plan tasks carefully (reversed). Items are rated on a 4-point rarely/never to almost always/always scale. Higher scores indicate higher levels of impulsivity.

Rosenberg Self-esteem Scale (Rosenberg, 1965): this is a well-validated measure of feelings of self-worth (e.g., I feel that I'm a person of worth, at least on equal plane with others). Responses are based on how much participants generally agree with each of the 10-items on a 4-point strongly agree to strongly disagree scale. Higher scores indicate higher self-esteem.

Personal Need for Structure Scale (Thompson et al, 1989): this measure assesses to what degree people need to "make sense" of things around them (e.g., I become uncomfortable when the rules in a situation are not clear; I'm not bothered by things that interrupt my daily routine [reversed]). Items are scored on a 6-point Likert-type scale with higher scores indicating more need for structure.

Self-concept Clarity Scale (Campbell et al., 1996) measures the extent to which self-beliefs are clearly defined, internally consistent, and temporally stable (e.g., In general, I have a clear sense of who I am and what I am; My beliefs about myself often conflict with one another [Reversed]); . Responses to the 12 items are rated on a 5-point strongly disagree to strongly agree scale. Higher scores indicate greater self-stability.

Communication Flexibility Scale: (Martin & Rubin, 1994) is a 14-item scale that assesses a person's ability to adapt their behavior from situation to situation as well as within situations in order to communicate effectively and appropriately. This measure presents scenarios that participants rate on a 1 to 5 exactly like me to not at all like me scale. Sample item: "*You are invited to give a speech about the university at a city council meeting. Everything seems fine at first, but then fifteen minutes into the speech, several members of the audience start talking to each other. You quickly end the speech and thank the group for their time*". High scores indicate higher levels of **behavioral**

*flexibility*. This measure was used as a dependent measure of behavioral flexibility (please see Appendix F).

*Cognitive Flexibility Scale*: (Martin & Rubin, 1995) is a 12-item scale that assesses the a person's awareness that in any given situation there are options and alternatives available, their willingness to be flexible and adapt to the situation, and their level of self-efficacy in being flexible. Items (e.g., I can communicate an idea in many different ways; I seldom have choices when deciding how to behave [reversed]) are rated on a 1 to 6 strongly disagree to strongly agree scale with higher scores indicating higher levels of cognitive flexibility.

*Self-descriptive recording*: upon completion of online questionnaires, participants were instructed to record an up to 5 minute self-description where they were asked to describe themselves in terms of their different traits, the roles they have in life, their relationships with other people, and their attitudes and beliefs. The experimenter left the room while participant was recording and a bell was placed next to the participant so they could “ding” the bell when finished, signaling the experimenter to come back.

*Linear Mouse Procedure*: After the recording session, the experimenter gave the participant the following instructions: “*On the computer monitor, you will see a black screen with seven vertical white lines. The middle line will be solid, but the others will be dashed. Think of this as a scale for indicating the positivity or negativity of your self-descriptions. When you feel positive about your self-descriptions, move the cursor toward the right side of the screen. The very right side of the screen represents feeling the most positive. When you feel negative about your self-descriptions, move the cursor toward the left side of the screen. The very left side represents feeling the most negative. There is no*

*“right” or “wrong” way to move the cursor. Keep your hand on the mouse at all times and move the cursor based on how you feel. You can move it in any left or right direction, but remember that the right edge of the screen represents the most positive feelings and the left edge of the screen represents the most negative feelings.”*

The linear mouse procedure is similar to the original mouse procedure used in Study 1 and, like the original mouse, is a measure of self-concept dynamism.

### *Self-Concept Dynamism*

Raw data from the mouse procedure was transformed into a *self-concept dynamism* index by calculating a mean velocity score for each participant from their absolute velocity scores. For a more detailed description of how the self-concept dynamism index was calculated from raw mouse data, please see Appendix G. Because velocity reflects the rate of change in evaluation, higher mean velocity scores indicate higher levels of self-concept dynamism. Results should show that higher levels of self-concept dynamism should be associated with lower levels of self-concept stability.

**Session 2:** During Session 2, participants completed multiple online assessments designed to assess self-esteem stability once approximately every 12 hours from 10:00 pm Monday to 10:00 am Friday at a location convenient to participant.

*Self-Esteem Stability* (Kernis et al., 2000): Self-esteem stability was assessed by having participants complete a modified version of Rosenberg’s self-esteem questionnaire twice a day, approx. 12 hours apart, for five consecutive days. Questions were modified from the original Rosenberg self-esteem scale to assess the participants’ momentary self-esteem (e.g., Right now I feel that I am a person of worth, at least on an equal basis with others.) For each online assessment, questions were presented in a

different order. Response anchors of strongly disagree to strongly agree were separated by 4 dots, and participants were asked to circle the dot that best reflects how much the agree with each item "at this moment".

A stability index was calculated by computing the standard deviation of the scores across 10 assessments. Higher standard deviation scores indicate lower levels of self-esteem stability. This is a well-validated index of self-esteem stability that has previously been used to compare life satisfaction and behavioral outcomes in those with stable and unstable self-esteem (Kernis, 2005).

## Results

### **Primary Analyses**

The first analysis tested the primary hypothesis that those with higher levels of self-esteem stability will score significantly lower on measures of behavioral and cognitive flexibility. Scores on behavioral and cognitive flexibility from self-esteem stability groups (i.e., stable and unstable) were based on 30 observations. Stable and unstable groups were determined by a median split. A total of 48 out of 52 participants completed two or more online self-esteem stability questionnaires; however, scores are reported only on participants who filled out five or more questionnaires ( $n=30$ ). Table 2.1 indicates the mean behavioral flexibility scores and standard deviations for each group (i.e., stable and unstable self-esteem).

Table 2.1 Behavioral flexibility means, standard deviations, and number of participants in stable and unstable self-esteem groups.

<u>Flexibility</u>	<u>Stable</u> <i>M/SD/n</i>	<u>Unstable</u> <i>M/SD/n</i>
Behavioral	51.67/4.56/15	55.47/5.17/15
Cognitive	58.27/6.35/15	59.80/6.38/15

Results from an independent-samples *t*-test show that those with stable self-esteem scored significantly lower on behavioral flexibility ( $M= 51.67$ ;  $SD= 4.56$ ) than those with unstable self-esteem ( $M= 55.47$ ;  $SD= 5.17$ ),  $t(28)= 2.13$ ,  $p= .042$ ;  $d=.15$ ). Although those with stable self-esteem did score slightly lower on cognitive flexibility ( $M= 58.27$ ;  $SD= 6.35$ ) than those with unstable self-esteem ( $M= 59.80$ ;  $SD= 6.38$ ), the difference between the two groups was not significant,  $t(28)= .659$ ,  $p= .515$ , *ns*.

### **Additional Analyses**

#### Correlational Analyses

A correlational analysis was conducted to examine relationships between personality factors (i.e., impulsivity, self-esteem level, personal need for structure, and self-concept clarity, self-concept dynamism) self-esteem stability, and behavioral and cognitive flexibility. Table 2.2 displays results of correlations and reliability indexes for all measures used in this study (Please see Appendix H for score ranges, means, standard deviations, and *N* for each scale).

Table 2.2. Study 2 scale correlations and reliability indexes

	1	2	3	4	5	6	7	8
1. DYN	-							
2. STAB	.21	-						
3. IMP	-.02	.24	(.83)					
4. SE	.04	-.13	-.52***	(.85)				
5. PNS	.03	-.33*	-.10	-.17	(.79)			
6. SCC	-.04	-.32*	-.58***	.55***	-.15	(.89)		
7. BF	.03	.54***	-.12	.20	-.56***	.10	(.62)	
8. CF	.06	.05	-.50**	.61***	-.10	.37	.41**	(.78)

Note: DYN= Self-concept dynamism, STAB= Self-esteem stability, IMP= Impulsivity, SE=Self-esteem level, PNS= Personal need for structure, SCC=Self-concept clarity, BF= Behavioral Flexibility; CF= Cognitive Flexibility. Self-esteem stability was scored such that low values reflect high stability. Reliability indexes (Cronbach's alpha) are reported in parentheses.

\*= $p < .05$ , \*\*= $p < .01$ , \*\*\*= $p < .001$ .

As expected, self-esteem stability and behavioral flexibility were correlated in the expected direction,  $r(45) = .54, p < .001$ , showing that those with lower levels of self-esteem stability (i.e., high scores indicate low stability) tended to score higher on behavioral flexibility. Behavioral flexibility was also significantly negatively correlated with personal need for structure,  $r(52) = -.56, p < .001$ , indicating that higher levels of behavioral flexibility were associated with lower levels of personal need for structure. Self-esteem stability was not correlated significantly with cognitive flexibility,  $r(45) = .05, p > .05, ns$ .

Results indicate that cognitive flexibility was significantly negatively correlated with impulsivity,  $r(52) = -.50, p < .001$ ; and positively correlated with self-esteem level,  $r(52) = .61, p < .001$ ; and behavioral flexibility,  $r(52) = .41, p < .01$ . Thus, higher levels of cognitive flexibility are associated with lower impulsivity, higher self-esteem, and higher behavioral flexibility. Self-concept clarity is significantly negatively correlated with self-esteem stability,  $r(45) = -.32, p < .05$  and impulsivity  $r(52) = -.58, p < .001$ ; and positively correlated with self-esteem  $r(52) = .55, p < .001$ . Self-concept clarity is therefore



associated with higher levels of self-esteem stability (low scores indicate high stability), lower levels of impulsivity, and higher levels of self-esteem. A significant negative correlation between impulsivity and self-esteem was found,  $r(52) = -.52, p < .05$ , such that those with higher levels of self-esteem tend to report lower levels of impulsivity.

State self-esteem scores were calculated by averaging the scores from the multiples self-esteem assessments completed over five days. A correlational analysis shows that state self-esteem is highly correlated with global self-esteem level ( $r(46) = .610, p < .001$ ).

### Regression analyses

In order to test unique contributions to the variance in behavioral and cognitive flexibility, hierarchical analyses were conducted. Following Kernis and colleagues (Kernis et al., 2000; 2008) and others (Seery et al., 2004) self-esteem stability was examined as a continuous variable. Predictor variables were centered by subtracting the variable mean from all scores, thereby standardizing values.

A hierarchical regression analysis was conducted with behavioral flexibility as the criterion variable. Predictor variables most strongly correlated with behavioral flexibility were entered first: Step 1. personal need for structure; Step 2. self-esteem stability; Step 3. self-esteem level; Step 4. impulsivity; Step 5. self-concept clarity; and Step 6. self-concept dynamism.

Step 1 (i.e., personal need for structure) produced a statistically significant regression model,  $F(1,33) = 14.13, p = .001, R^2 = .300$ . Step 2 (i.e., self-esteem stability) produced a significant change in  $R^2, F(1,32) = 6.73, p = .014, sr^2 = .122$ , indicating that personal need for structure and self-esteem stability each had a significant unique effect on behavioral flexibility. The addition of the remaining four predictors (i.e., self-esteem level,

impulsivity, self-concept clarity, and self-concept dynamism) did not significantly increase the model  $R^2$ ,  $F(1,31)= 2.18, p=.15, sr^2= .038$ ;  $F(1,30)= 1.67, p=.20, sr^2= .029$ ;  $F(1,29)= .016, p=.90, sr^2= .001$ , and  $F(1,28)= 1.38, p=.24, sr^2= .024$ , respectively. The resulting model  $R^2$  with the two uniquely significant predictor variables entered in Steps 1 and 2 was significantly greater than zero,  $F(2,32)=11.66, p<.001$ . This model predicted a significant amount of the variance in behavioral flexibility (42%). The adjusted  $R^2$  showed a decrease in the amount of variance predicted (.38) upon generalization to the population.

A second hierarchical regression was conducted to examine if self-esteem stability is a significant predictor of behavioral flexibility after the contributions of all other variable are controlled for. Predictors were entered in the following order: Step 1: dynamism Step 2: impulsivity; Step 3: self-esteem level; Step 4: self-concept clarity; Step 5: personal need for structure; and lastly, Step 6: self-esteem stability. Results indicate that the addition of self-esteem stability to the model produced a significant change in  $R^2$ ,  $F(1,28)= 9.51, p= .005, sr^2= .166, b=.45$ , indicating that self-esteem stability had a significant unique effect on behavioral flexibility after controlling for all other variables.

A regression analysis entering all six predictors at the same time show results similar to the hierarchical regression: significant  $R^2$  change ceases after personal need for structure and self-esteem stability are entered. The total model predicted a significant amount of the variance in behavioral flexibility ( $R^2=.51$ ; Adjusted  $R^2 =.41$ ;  $p=.02$ ).

Next, a hierarchical regression analysis was conducted with cognitive flexibility as the criterion variable. Again, predictor variables were entered in order of the strength of their correlation with cognitive flexibility: Step 1. self-esteem level; Step 2. impulsivity; Step

3. self-concept clarity; Step 4. personal need for structure; Step 5. self-concept dynamism; and Step 6. self-esteem stability.

Step 1 produced a statistically significant regression model,  $F(1,33)= 24.76, p<.001, R^2= .429$ ; indicating that self-esteem level had a significant unique effect on cognitive flexibility. The addition of the remaining five predictors (i.e., impulsivity, self-concept clarity, personal need for structure, self-concept dynamism, and self-esteem stability) did not significantly increase the model  $R^2, F(1,32)= .807, p=.37, sr^2= .014; F(1,31)= .138, p=.71, sr^2= .002; F(1,30)= .241, p=.62, sr^2= .004; F(1,29)= .004, p=.95, sr^2= .001; F(1,28)= 1.89, p=.18, sr^2= .035$ , respectively. Although impulsivity is significantly correlated with cognitive flexibility ( $r=-.50$ ), results indicate that it does not uniquely contribute to the variance in cognitive flexibility when self-esteem level is controlled for. The resulting model predicts a significant amount of the variance in cognitive flexibility (42%). The adjusted  $R^2$  showed a decrease in the amount of variance predicted (.41) upon generalization to the population.

Another regression analysis was conducted to examine if self-esteem level is a significant predictor of cognitive flexibility after the contributions of all other variable are controlled for. Predictors were entered in the following order: Step 1: self-esteem stability; Step 2: dynamism; Step 3: self-concept clarity; Step 4: personal need for structure; Step 5: impulsivity; and Step 6: self-esteem level. Results indicate that the addition of self-esteem level to the model produced a significant change in  $R^2, F(1,28)= 10.89, p= .003, sr^2= .20, b=.59$ , indicating that self-esteem level had a significant unique effect on cognitive flexibility after controlling for all other variables.

The results of a regression analysis entering all predictors at the same time are similar to the hierarchical regression: significant  $R^2$  change ceases after self-esteem level is entered. The total model predicted a significant amount of the variance in cognitive flexibility ( $R^2=.48$ ; Adjusted  $R^2 =.37$ ;  $p=.003$ ).

The above regression analysis supports that results of an independent samples t-test showing that those with high self-esteem scored significantly higher on cognitive flexibility ( $M=61.92$ ;  $SD=4.72$ ) than those with low self-esteem ( $M=54.57$ ;  $SD= 4.72$ ;  $t(50)= 5.23$ ,  $p<.001$ )

In the above multiple regression analyses, there appeared to be no collinearity difficulties as all variance inflation factors (VIF's) were under 2.00.

#### *Self-Concept Dynamism and Self-Esteem Stability*

Using raw data from the results of the linear mouse procedure, a self-concept dynamism index was calculated based on the velocity of mouse movement while participants evaluated the positivity and negativity of their own self-descriptions. Those who are less stable in their self-esteem should show higher levels of self-concept dynamism.

An independent samples  $t$ -test was conducted to compare the self-concept dynamism scores of participants in stable and unstable median split, self-esteem stability groups. Self-concept dynamism indexes ranged from 3.27 to 249.63, with higher scores indicating higher levels of self-concept dynamism. Results showed that those in the unstable self-esteem group had significantly higher self-concept dynamism scores ( $n= 21$ ,  $M=67.55$ ,  $SD=67.56$ ) than those in the stable self-esteem group ( $n=30$ ,  $M=37.89$ ,  $SD=22.87$ ),  $t(49)=2.39$ ,  $p=.02$ ,  $d=.27$ .

Correlational analyses indicate a positive but non significant association between self-concept dynamism and self-esteem stability,  $r(44) = .20, p = .17, ns$ .

Consistent with idea that higher levels of dynamism in a self-system would be more indicative of an unstable system than a stable system, results show those with unstable self-esteem have higher levels of self-concept dynamism, therefore providing additional validity for the mouse procedure paradigm as a measure of self-concept dynamism.

### *Discussion*

The results of Study 2 supported the prediction that those with higher levels of self-esteem stability would score lower on behavioral flexibility than those with lower levels of self-esteem stability. The behavioral flexibility measure used in this study was different than the one used in Study 1 as it assessed participants' ability to adapt their behavior from situation to situation as well as within situations in order to communicate effectively and appropriately, as opposed to participants' reported range of behaviors. Specifically, results showed that those with stable self-esteem scored significantly lower on behavioral flexibility than those with unstable self-esteem and the results of regression analyses indicate that self-esteem stability is a significant predictor of behavioral flexibility. In Study 1, scores on the behavioral flexibility measure trended in the predicted direction, but the results were not significant.

Although scores trended in the predicted direction, those with stable self-esteem did not score significantly lower on cognitive flexibility as was predicted. Interestingly, results show that self-esteem *level* is a stronger predictor of cognitive flexibility than is self-esteem *stability*. Specifically, results indicate a strong association between high self-esteem and higher scores on cognitive flexibility in correlation and regression analyses

and when means are compared between participants in high and low self-esteem groups. This supports the results of Study 1, which also showed a significant association between self-esteem level and cognitive flexibility.

Results show however that self-esteem level is not significantly associated with behavioral flexibility suggesting that the skills associated with behavioral and cognitive flexibility are associated with different dimensions of self-esteem. Because the overarching hypothesis for this series of studies focuses on the effects of self-esteem stability, a construct that appears to be more closely associated to behavioral flexibility than cognitive flexibility, the focus of Study 3 will be on behavioral flexibility.

### **Study 3: Self-Esteem Stability, Behavioral Flexibility, and Stress**

The results of Study 2 showed a significant relationship between self-esteem stability and behavioral flexibility such that those with stable self-esteem reported lower levels of flexibility than those with unstable self-esteem. There were two primary goals for Study 3. The first goal was to test whether the relationship between self-esteem stability and behavioral flexibility that was found in Study 2 will also be found when participants have the opportunity to be flexible in an actual social situation.

The second goal of this study was to test how the relationship between self-esteem stability and behavioral flexibility is affected by stress. This is a relevant research question, as some of the most important social situations can also be the most stressful (e.g., giving a speech, job interviews, negotiating a disagreement with an important other; performance evaluation) and a willingness and ability to make the necessary adjustments to changing social demands are particularly advantageous in these situations. It is

therefore important to know how the relationship between self-esteem stability and behavioral flexibility is affected by stress. There are several questions worth asking about this relationship. For example, do people with stable self-esteem become more or less flexible under stress?

Hypotheses for Study 3 are based on the results of Study 1 and Study 2 and dynamical systems theory, which views stress as an agent that perturbs the system: 1) those with stable self-esteem should be less willing than those with unstable self-esteem to switch to a non dominant role (i.e., will show lower levels of behavioral flexibility) in the no stress condition; this supports the results from Studies 1 and 2; 2) it is expected that stress will amplify the effect of self-esteem stability such that those with high levels of self-esteem stability will show lower flexibility in the stress condition than in the no stress condition. This hypothesis supports the idea that when stress perturbs the self-system it decreases the potential for nondominant responses and therefore one's dominant response becomes the most likely response; and, also supporting an amplifying effect of stress, 3) participants with lower levels of self-esteem stability should show higher levels of behavioral flexibility in the stress condition than in the no stress condition. This hypothesis supports the idea that unstable self-views are further weakened by stress, thereby further attenuating an already weak dominant response and giving rise to higher levels of flexibility in behavior under conditions of stress.

### *Study Design*

Study 3 has a 2 (stable/unstable) X 2 (stress/no stress) quasi-experimental design. The dependent variable is behavioral flexibility. This study examines the relationship between

self-esteem stability and behavioral flexibility and looks at the effects of stress on this relationship.

## Method

### *Participants*

Seventy-one undergraduate students (32 men, 39 women) participated in this study in exchange for research participation credit. Participants ranged in age from 18 to 28 ( $M=19.20$ ;  $SD=1.79$ ), and were representative of an ethnically diverse university student population (Caucasian 46%; Hispanic 24%; African American 14%; Asian and other 16%).

### *Materials and Procedure*

This study took place in two sessions. Participants were told that the study examines how personality characteristics influence the behaviors of others. During Session 1, participants completed a series of online questionnaires, which assessed various trait-like dimensions of personality (i.e., Eysenck Personality Questionnaire (EPQ); Self-Monitoring Scale (SMS); Rosenberg Self-Esteem Scale (RSES); Behavior Identification Form (BIF); Personal Need for Structure Scale (PNS); Self-Concept Clarity Scale (SCC).

Session 2, which took place the following week, involved administering the experimental manipulation (Stress/No Stress conditions) and the dependent measure (Behavioral Flexibility). The multiple online Self-esteem Stability assessments were completed over five days during the interval between Session 1 and Session 2.

**Session 1:** Participants filled out a series of online questionnaires, which assessed various trait-like dimensions of personality:



Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975): this is a 90 item Yes/No measure that assesses various dimension of personality and includes an extraversion/introversion subscale (e.g., Are you a talkative person?; Do you enjoy meeting new people?). This measure was used to calculate an extraversion/introversion score for each participant to determine if extraversion or introversion would be the dominant response for each participant.

Self-Monitoring Scale (Lennox & Wolfe, 1984): this is a 13-item scale (e.g., I have the ability to control the way I come across to people, depending on the impression I wish to give them) with responses made on a 6-point Likert-type scale (0= certainly, always false; 5= certainly, always true). Previous studies indicate a relationship between self-monitoring and behavioral flexibility (Hall, Workman, & Marchioro, 1998) with higher levels of self-monitoring indicating greater behavioral flexibility.

Rosenberg Self-esteem Scale (Rosenberg, 1965): this is a well-validated measure of feelings of self-worth (e.g., I feel that I'm a person of worth, at least on equal plane with others). Responses are based on how much participants generally agree with each of the 10 items on a 4-point strongly agree to strongly disagree scale. Higher scores indicate higher self-esteem.

Behavior Identification Form (Vallacher & Wegner, 1989): this is a 25-item measure, which gives participants a choice between a high or low level action identification (e.g. Reading: following lines of print (Low) or gaining knowledge (High)). The total score is the sum of higher level choices.

Personal Need for Structure Scale (Thompson et al, 1989): this measure assesses to what degree people need to "make sense" of things around them (e.g., I become

uncomfortable when the rules in a situation are not clear; I'm not bothered by things that interrupt my daily routine [reversed]). Items are scored on a 6-point Likert-type scale with higher scores indicating more need for structure.

*Self-concept Clarity Scale* (Campbell et al., 1996) measures the extent to which self-beliefs are clearly defined, internally consistent, and temporally stable (e.g., In general, I have a clear sense of who I am and what I am; My beliefs about myself often conflict with one another [Reversed]); . Responses to the 12 items are rated on a 5-point strongly disagree to strongly agree scale. Higher scores indicate greater self-concept clarity.

Upon completion of the assessments, which generally took between 20 and 30 minutes, participants were given instructions for completing multiple online self-esteem stability assessments over a period of 5 consecutive days. Participants then signed up for Session 2 by choosing from a list of times to return (approximately one week later).

#### *Linear Mouse Procedure*

After completion of the questionnaires in Session 1, the same linear mouse procedure that was used in Study 2 was used on a small sample ( $n=15$ ) in this study to see if results would support the findings in Study 2. As in Study 2, these participants were asked to record an up to 5 minute self-descriptive recording and then evaluate the positivity vs. negativity of their self-descriptions using the linear mouse procedure and a self-concept dynamism index was generated.

#### *Self-Concept Dynamism*

Raw data from the linear mouse procedure was transformed into a *self-concept dynamism* index by calculating a mean velocity score for each participant from their absolute velocity scores. For a more detailed description of how the self-concept

dynamism index was calculated from raw mouse data, please see Appendix G. Because velocity reflects the rate of change in evaluation, higher mean velocity scores indicate higher levels of self-concept dynamism. Results should show that higher levels of self-concept dynamism should be associated with lower levels of self-concept stability.

*Self-Esteem Stability* (Kernis et al., 2000): Self-esteem stability was assessed by having participants complete Rosenberg's self-esteem questionnaire twice a day, approx. 12 hours apart, for five consecutive days. A stability index was calculated by computing the standard deviation of the scores across 10 assessments. This is a well-validated measure of self-stability that has previously been used to compare life satisfaction and behavioral outcomes in those with stable and unstable self-esteem (Kernis, 2005). The multiple online Self-esteem Stability assessments were completed during the interval between Sessions 1 and 2.

**Session 2:** The experimental manipulation and dependent measure were administered during Session 2.

*Dependent Measure* (Behavioral Flexibility): assessed the degree to which participants were willing to switch from a dominant (habitual) role to a nondominant role in a supposed role-playing task (i.e., During the 10-minute role playing task, how willing are you to play the role of 1. extravert [outgoing, socially skilled, a people-person, eager to tackle new situations]; 2. introvert [thoughtful, sensitive, and quiet, not pushy, bossy, or demanding of attention]). Items were assessed on a 1-8, not at all willing to very willing scale (for participants who scored as extraverts on the EPQ in session 1, playing the introvert was a nondominant role, and for those scoring as introverts on the EPQ during session 1, playing the role of extravert was a nondominant role).

After arriving at their scheduled time, participant was seated in the testing room with the experimenter. The experimenter then said the following to the participant:

*“Hi. I just want to remind you that the purpose of this study is to find out how a person’s personality characteristics influence the behaviors of others. During this session you will be participating in a 10-minute role playing session in another room with another study participant. During this role playing task, you and your partner will discuss topics such as relationships and college experiences. One of you will play the role of an extravert: outgoing, socially skilled, a people-person, eager to tackle new situations. And one will play the role of an introvert: thoughtful, sensitive, and quiet, not pushy, bossy, or demanding of attention. Do you understand the differences between extraversion and introversion?”* (Note: experimenter provided clarification if needed).

*“We randomly assigned you to the play the role of the extravert/introvert (Note: after Session 1, participants whose score on the EPQ reflected an extraverted personality were “assigned” the role of extravert [their dominant response] during Session 2 and those who scored as introverts were “assigned” the role of introvert [their dominant response]); however, you will have the option of switching roles before the role playing task begins in just a few minutes”*

### *Stress*

In this study, stress is operationalized as the anticipation of being evaluated by others or evaluation apprehension (Cottrell et al., 1968; Seta & Seta, 1992). Previous research has indicated that being evaluated by others is linked to physiological stress responses (Hughes, 2007; Kelsey et al., 2000) and reported stress levels on self-report measures (Hughes, 2006). Stress was manipulated by telling participants in the stress condition that the supposed role playing session they were supposedly participating in was to be evaluated by students behind a one-way mirror that were training to become behavioral therapists. This procedure is similar to a procedure used by Tice (1992), who looked at self-concept change when behaviors are performed publicly or privately.

**Stress/No Stress Conditions:** The participant was then told the following, depending on which condition they were assigned to (stress/no stress):

**Stress Condition:** *“In a few minutes we will go into another room with your partner. I need to inform you that your role playing session will be evaluated by students behind a one way mirror who are training to become behavioral therapists. After the role playing session you will be asked to fill out a few short questionnaires regarding the session.*

**No Stress Condition:** *“After the role playing session you will be asked to fill out a few short questionnaires regarding the session.”*

Following these instructions, participants were seated at a computer in the room and asked to complete an online rating of how willing he/she is to play each role (extravert/introvert). After participant was seated, experimenter said: *“I am going to leave the room for a moment. While I am gone please rate how willing you are to play each role. I will come back in when you ding the bell.”* In addition to their willingness rating, participants were also timed for how long it took to decide their willingness to play each role.

*Manipulation Check:* At the conclusion of the Session 2, participants were asked to rate (on a five-point very stressed to not stressed at all scale), the degree of stress they felt when they were told they would be role-playing with another person. Those in the stress condition should report higher levels of stress than those in the no stress condition. Upon completion of Session 2, participants were thanked and fully debriefed.

## Results

### Primary Analyses

#### Manipulation check

A post-experimental questionnaire assessed the degree of stress participants felt when they were told they would be role-playing with another person. Although those in the stress condition ( $M=1.82$ ;  $SD=.79$ ) did report slightly higher stress ratings than those in

the no stress condition ( $M=1.80$ ;  $SD=.76$ ), the results were not significant,  $F(1,67) = .016$ ,  $p=.90$ , *ns*.

Results of Analysis of Variance (ANOVA):

The main dependent variable was the single item behavioral flexibility assessment asking participants how willing they are to play a nondominant response role during the 10-minute role playing task. The data for behavioral flexibility are in Table 3.1.

*Table 3.1. Behavioral Flexibility means, standard deviations, and number of participants in no stress and stress conditions.*

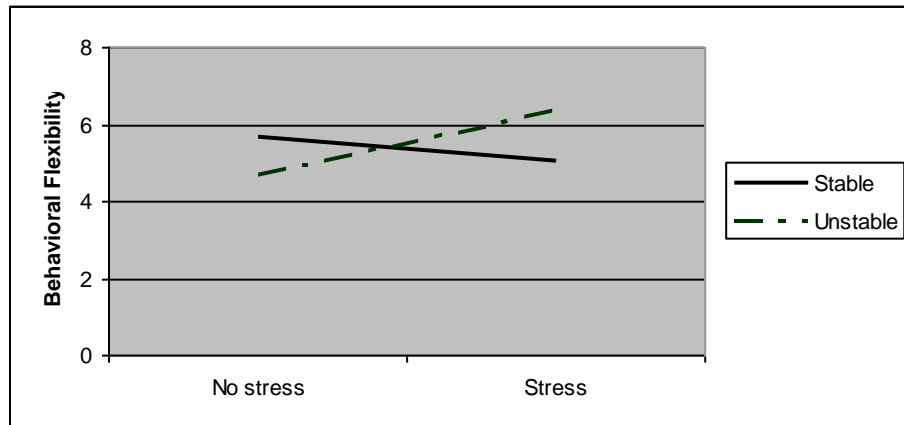
	<u>No stress condition</u>	<u>Stress condition</u>
<b><u>Flexibility</u></b>	<b><u>M/SD/n</u></b>	<b><u>M/SD/n</u></b>
Stable Self-esteem	5.68/2.08/19	5.06/1.60/17
Unstable Self-esteem	4.67/2.16/15	6.35/1.83/17

The experiment consisted of a 2 (stable vs. unstable) X 2 (stress vs. no stress) design and participants were distributed approximately equally across the four conditions. A two-way analysis of variance (ANOVA) showed no main effect for stability,  $F(1,64) = .92$ ,  $p > .05$ , *ns*,  $\eta^2 = .001$ , indicating that regardless of stress condition, those with stable self-esteem did not differ significantly from those with unstable self-esteem on behavioral flexibility.

Likewise, there was no main effect for stress,  $F(1,64) = .22$ ,  $p > .05$ , *ns*,  $\eta^2 = .01$ . Thus, regardless of whether the participant had stable or unstable self-esteem, those in the stress condition did not differ significantly on behavioral flexibility than those in the no stress condition.

Results did however show a significant stability x stress interaction effect  $F(1,64)=6.06, p=.01, \eta^2= .09$ . Specifically, participants with stable self-esteem in the stress condition showed lower levels of behavioral flexibility than they did in the no stress condition, and conversely, participants with unstable self-esteem showed higher levels of behavioral flexibility in the stress condition than they did in the no stress condition (please see figure 3.1). In other words, under stress, those with unstable self-esteem became more flexible in their behavior and those with stable self-esteem became less flexible. Effect sizes ( $\eta^2$ ) show that self-esteem stability and stress as main effect factors explain 1.1% of the variance in behavioral flexibility and the interaction between self-esteem stability and stress explains 9% of variance. Figure 3.1 illustrates the interaction effect of stability and stress on behavioral flexibility. The assumption of equal variances between groups was not rejected based on Levene's test,  $p=.619$ .

Figure 5. Stability by Stress Interaction





Planned comparisons using independent samples t-tests showed that although scores trended in the predicted direction (i.e., participants with stable self-esteem would score lower in the stress condition than in the no stress condition) those with stable self-esteem showed no significant difference in behavioral flexibility in the no stress ( $M= 5.68$ ;  $SD=2.08$ ) and stress conditions ( $M= 5.06$ ;  $SD=1.60$ ),  $t(34)= 1.00$ ,  $p= .32$ , *ns*. Participants with unstable self-esteem, however, indicated significantly higher levels of behavioral flexibility in the stress condition ( $M=6.35$ ;  $SD=1.83$ ) than in the no stress condition ( $M=4.67$ ;  $SD= 2.16$ ),  $t(30)= 2.39$ ,  $p=.023$ ,  $d= .22$ . Therefore, for those with unstable self-esteem, there were significant differences in behavioral flexibility between the no stress and stress conditions.

Also, comparisons show no significant difference in behavioral flexibility between those with stable ( $M=5.68$ ;  $SD=2.08$ ) and unstable self-esteem ( $M=4.67$ ;  $SD= 2.16$ ) in the no stress condition,  $t(32)=1.39$ ,  $p=.17$ , *ns*. However, in the stress condition, results show that those with unstable self-esteem ( $M=6.35$ ;  $SD= 1.83$ ) show significantly higher levels of behavioral flexibility than those with stable self-esteem ( $M=5.06$ ;  $SD= 1.60$ ),  $t(32)=2.19$ ,  $p=.03$ ,  $d= .13$ . Thus, in the stress condition, there were significant differences in behavioral flexibility between those with stable and unstable self-esteem.

### **Additional Analyses**

#### **Correlations of Measures Used in this Study**

Table 3.2 displays the reliability indexes and the correlation matrix for all measures used in this study. (Please see Appendix I for score ranges, means, standard deviations, and  $N$  for each scale).

Table 3.2: Study 3 scale correlations and reliability indexes.

	1	2	3	4	5	6	7	8
1. DYN	-							
2. WILL	.29	-						
3. STAB	.43	.09	-					
4. SMS	.19	.14	.14	(.72)				
5. SE	-.11	.05	-.10	.05	(.87)			
6. ActID	-.14	-.01	-.15	-.17	.22	(.80)		
7. PNS	.10	.04	-.07	.10	-.25*	.12	(.68)	
8. SCC	-.09	.02	-.09	-.02	.62***	.35**	-.05	(.87)

Note: DYN= Self-concept dynamism, WILL= Willingness (DV), STAB=Self-esteem stability, SMS=Self-monitoring, SE=Self-esteem level, ActID= Action Identification, PNS= Personal need for structure, SCC=Self-concept clarity. Self-esteem stability was scored such that low values reflect stable SE. Reliability indexes are reported in parentheses.  
 \*= $p < .05$ , \*\*= $p < .01$ , \*\*\*= $p < .001$ .

Personal need for structure (PNS) and self-esteem level (SE) are correlated significantly such that those with lower levels of self-esteem tend to report higher levels of personal need for structure,  $r(71) = -.25, p < .05$ . Self-concept clarity (SCC) is significantly correlated with self-esteem (SE) indicating that higher self-esteem is associated with higher levels of self-concept clarity,  $r(71) = .62, p < .001$ . Action Identification (ActID) and self-concept clarity (SCC) are significantly correlated such that higher level action identities are related to higher levels of self-concept clarity,  $r(71) = .35, p < .01$ .

A state self-esteem score was calculated by averaging the scores from the multiples self-esteem assessments completed over five days. A correlational analysis shows that state self-esteem is highly correlated with global self-esteem level,  $r(71) = .726, p < .001$ .

### Regression Analyses

Kernis and colleagues (Kernis et al., 2000; 2008) and others (Seery et al., 2004) analyze self-esteem stability as a continuous variable. Therefore, to test the interaction

effects on behavioral flexibility in a regression analysis, an interaction term was computed (i.e., standardized stability scores x standardized stress).

Because a correlational analysis shows that personality factors (i.e., self-concept dynamism, self-monitoring, self-esteem level, action identification, personal need for structure, and self-concept clarity) were not significantly correlated with behavioral flexibility, only the interaction term (Step 1) and the main effect variables, stability (Step 2) and stress (Step 3) were entered into the regression analysis. Step 1 (i.e., interaction) produced a statistically significant regression model,  $F(1,66)= 4.62, p=.035, R^2= .065$ . The addition of the main effect factors (i.e., stability and stress) did not significantly increase the model  $R^2$ ,  $F(1,65)= .074, p=.79, sr^2= .001, b=.01$ ;  $F(1,64)= .915, p=.34, sr^2= .013, b=.12$ , respectively. These results indicate that the interaction between self-esteem stability and stress is a significant predictor of behavioral flexibility.

A regression analysis entering the interaction term, stability, and stress at the same time did not produce a significant regression model,  $F(3,64)= 1.86, p=.15$ , however the beta coefficient for the interaction term was tested for significance ( $t=b/se[b]$ ;  $b= .508, se[b]= .247$ ), showing a  $t$ -value of 2.05,  $p<.05$ . This indicates a significant relationship between the interaction of self-esteem stability and stress, and behavioral flexibility.

The variance inflation factors (VIF's) are all under 2.00, indicating no collinearity difficulties in the above multiple regression analysis.

#### Linear Mouse Data Analyses

The same linear mouse procedure that was used was used in Study 2 was also used on a small sample ( $n=15$ ) in the current study to see if results would support the findings in Study 2. As in Study 2, a *self-concept dynamism* index was generated by calculating a

mean velocity score for each participant from their absolute velocity scores. Higher mean velocity scores indicate higher levels of self-concept dynamism. An independent samples *t*-test was conducted to compare the average mean velocity scores (i.e., self-concept dynamism) of participants in high and low, median split, self-esteem stability groups.

### **Self-Concept Dynamism and Stability**

Self-concept dynamism indexes ranged from 11.81 to 186.07, with higher scores indicating higher levels of dynamism. Results were similar to Study 2 and again supported an inverse relationship between dynamism and stability by showing that those in the low stability group had significantly higher self-concept dynamism scores ( $M=97.93$ ,  $SD=57.50$ ) than those in the high stability group ( $M=44.52$ ,  $SD=28.43$ ),  $t(13)=2.22$ ,  $p=.04$ .

Correlational analyses indicated an association between self-concept dynamism and self-esteem stability that approached significance,  $r(15)=.43$ ,  $p=.10$ , indicating that those with lower levels of self-esteem stability (i.e., higher standard deviation scores from the total scores of multiple self-esteem measures) tended to show higher levels of self-concept dynamism (i.e., more velocity of mouse movement during the linear mouse procedure). Self-concept dynamism was not significantly correlated with self-monitoring, self-esteem level, action identification, personal need for structure, or self-concept clarity.

### *Discussion*

The results of Study 3 did not support the first hypothesis, which predicted that those with stable self-esteem would be less willing than those with unstable self-esteem to switch to a non dominant role (i.e., show lower levels of behavioral flexibility) in the no stress condition. Results for the second hypothesis that those with high levels of self-

esteem stability will show lower flexibility in the stress condition than in the no stress condition showed the scores trending in the predicted direction, however, results were not significant. Results did, however, support the third hypothesis that participants with lower levels of self-esteem stability would show higher levels of behavioral flexibility in the stress condition than in the no stress condition.

Interestingly, the results of a two-way ANOVA found a significant interaction effect, such that participants with stable self-esteem scored higher on behavioral flexibility than those with unstable self-esteem in the no stress condition and participants with unstable self-esteem scored higher than those with stable self-esteem in the stress condition (please see figure 3.1). However, a main effect for self-esteem stability was not found indicating no significant difference between the stable and unstable group on behavioral flexibility. Likewise, there was no significant main effect for stress as no difference was found in behavioral flexibility scores for those in the no stress and stress conditions. However, participants with stable self-esteem tended to show less behavioral flexibility in the stress condition than in the no stress condition (although not significantly so) and those with unstable self-esteem were significantly more flexible in the stress condition than they were in the no stress condition. In addition, the difference in behavioral flexibility for participants with stable and unstable self-esteem in the stress condition was significant such that participants with unstable self-esteem in the stress condition showed significantly higher levels of behavioral flexibility than participants with stable self-esteem in the stress condition.

This supports the dynamical view of what happens to an attractor landscape when the system is perturbed. Participants whose self-esteem is represented by a stable attractor

showed an increased inclination for a dominant (habitual) response. This supports the idea that when stress perturbs the system it decreases the potential for nondominant responses and therefore one's dominant response becomes the most likely response. In contrast, participants whose self-esteem is represented by an unstable attractor showed higher levels of flexibility under stress indicating that unstable self-views are further weakened by stress, thereby further attenuating an already weak dominant response and giving rise to higher levels of flexibility in behavior under conditions of stress. It also interesting to note that the principles of dominant response theory, which purport that arousal increases the potential for a dominant response holds true for those with stable self-esteem but not for those with unstable self-esteem.

The post-experimental manipulation check questionnaire assessed the degree of stress participants felt when they were told they would be role-playing with another person. Stress ratings for those in the stress and no stress conditions were almost identical and therefore the difference between groups was non significant. This might be an indication that the stress manipulation was not strong enough. However, given the interaction between stress and stability found in the results, this might not be so. An alternative explanation is that participants were asked to report their stress rating on a hard copy questionnaire that was collected by the experimenter and placed in a folder in the presence of the participant. It is possible that the participant might have been hesitant to say they felt stressed if they thought the experimenter would see their response. The stress rating questionnaire should have been presented in a way that allowed more anonymity of response.

## General Discussion

Across three studies, results showed that those with higher levels of self-concept stability (i.e., self-evaluative stability [Study 1]; self-esteem stability [Study 2 and Study 3] showed lower levels of flexibility (i.e., behavioral and cognitive flexibility [Study 1 and Study 2]; behavioral flexibility [Study 3]). The results of these three studies attest to the nuanced nature of the self-structure. Although self-esteem stability has been linked with more efficient self-regulation and other outcomes such as higher levels of life satisfaction, these studies suggest that there might be a price to pay in terms of behavioral complexity.

### *Summary of Main Findings*

The overarching hypothesis for this series of studies that, compared to those with less stable self-views, those with stable self-views will demonstrate lower levels of flexibility of behavior in response to changing social demands, was generated from a basic dynamical systems principle, which states that as a dynamical system becomes more stable the complexity of the system's behavior decreases. This dynamical principle was generalized to the self-system for this series of studies.

Accordingly, for Study 1, it was predicted that participants with higher levels of self-evaluative stability would report lower scores on measures of behavioral and cognitive flexibility. Results supported the prediction by showing that those with higher levels of self-evaluative stability reported significantly lower scores on cognitive flexibility, with scores trending in the same direction on a measure of behavioral flexibility.

Study 2 sought to replicate and expand on the findings of Study 1 using a well-validated measure of self-esteem stability (Kernis et al., 1989) and a measure of

behavioral flexibility that assesses a person's ability to adapt their behavior from situation to situation as well as within situations. In addition, the original mouse procedure used in Study 1 was replaced with the linear mouse procedure, which assesses self-concept dynamism on a one dimensional scale. A similar pattern of results was found showing that participants with higher levels of self-esteem stability reported significantly lower scores on behavioral flexibility than those with lower levels of self-esteem stability and reported scores on cognitive flexibility trended in the same direction.

The main question for Study 3 was: will the results of Study 1 and Study 2, showing lower levels of self-reported flexibility for those with stable self-esteem, hold up if participants are put into an actual situation and their behavior is assessed? The second question for Study 3 was: how will stress affect the relationship between self-esteem stability and behavioral flexibility? Predictions for Study 3 were based on attractor dynamics, which purports that stable self-esteem can be conceptualized as a fixed point attractor that is relatively resistant to perturbations (e.g., stress) and dominant response theory, which posits that stress increases the potential for a dominant (habitual) response.

Based on the main tenets of these theories, it was predicted that 1) those with stable self-esteem would be less willing than those with unstable self-esteem to switch to a non dominant response role in the no stress condition; 2) those with high levels of self-esteem stability would show lower flexibility in the stress condition than in the no stress condition; and 3) participants with lower levels of self-esteem stability will show higher levels of behavioral flexibility in the stress condition than in the no stress condition.

Stress was manipulated by telling participants in the stress condition that they were going



to be evaluated by students behind a one way mirror who were training to become behavioral therapists.

Results showed no main effects for self-esteem stability or stress, but the interaction (stability x stress) was significant, confirming the prediction that those with stable self-esteem stability would show lower flexibility in the stress condition than in the no stress condition and participants with unstable self-esteem would show higher levels of behavioral flexibility in the stress condition than in the no stress condition.

The self-concept dynamism index generated by calculating participants' mean velocity scores in Study 2 and Study 3 showed that as expected in both Study 2 and Study 3, those in the stable self-esteem group showed significantly lower levels of self-concept dynamism than those in the unstable self-esteem group. These findings support the validity of the mouse procedure paradigm as a measure of self-concept dynamism.

The results of these studies also support Kernis' report of low correlations between self-esteem level and self-esteem stability (from .10 to .30; Kernis & Waschull, 1995). Using Kernis' dynamical measure of self-esteem stability (Kernis et al., 1989) the correlations between self-esteem level and self-esteem stability were -.13 and -.10 for studies 2 and 3, respectively. Study 1 showed a significant correlation between self-esteem level and self-esteem stability (.57), however, in Study 1 Rosenberg's self-reported stability items were used, not a dynamical measure of self-esteem stability. This highlights the importance of using a dynamical measure of self-esteem stability and supports the contention that self-esteem level and self-esteem stability are separate constructs.

### *Implication, Limitations, and Future Research*

It's interesting that the effects of arousal purported by dominant response theory (Zajonc, 1965; that arousal increases the potential for dominant (habitual) responses), is evident among those with stable self-esteem but not among those with unstable self-esteem. In fact, the results of Study 3 indicate that those with unstable self-esteem showed significantly higher levels of flexibility in their behavior in the stress condition than in the no stress condition. This supports a model of self-evaluation as a mapped landscape that captures the potential for stability and turbulence in the self-system (Vallacher & Nowak, 2000). Consistent with dominant response theory, if one's self-view is stable (i.e., represented by a stable attractor), perturbations in the system (e.g., stress) would weaken potential non dominant (non habitual) responses and leave the dominant response as the only available course of action. In contrast, a relatively unstable self-system is characterized by weak attractors that are sensitive to system perturbations thereby allowing the system to freely move from state to state relatively indiscriminately. Studies indicate, however, that extreme instability in self processes are associated with clinical disorders such as suicidal ideation (Johnson & Nowak, 2002), borderline personality disorder (Koenigsberg, et al., 2002) and schizophrenia (Wexler et al., 2004). One of the limitations of this series of studies is that they did not examine optimal levels of self-esteem stability, but focused instead on differences between those with stable and unstable self-esteem as previous studies have done. Future studies may focus on mapping the attractor dynamics of optimal stability in cognitive and affective processes in healthy functioning individuals and compare them with the attractor dynamics of those with clinical disorders.

Another implication to these studies is that, although the results of this study confirm the idea that stable self-structures are relatively resistant to perturbations in the self-system, this may hold true only until some threshold of influence is reached. Nowak & Vallacher (1998) discuss, for example, how interactions between low level elements (e.g., thoughts, feelings, beliefs; people; Vallacher & Nowak, 1994; Nowak & Vallacher, 1998) can give rise to nonlinear, qualitative changes in system behavior and how a very stable system can suddenly become unstable and experience intense upheaval and change. This idea is interesting as it allows for change even when a system is seemingly entrenched in a particular pattern of behavior. Studies show for example, that when a strong attitude involves an important topic, such that there is a resistance to change in response to new information, at some critical threshold, consistently favorable or unfavorable information will lead to a sudden and dramatic change in attitude. This is in contrast to the more linear change in attitude that happens when information is received regarding less important topics (Latane & Nowak, 1994).

Likewise, on a larger scale, stable patterns of political and economic ideology can be dramatically changed by seemingly trivial events (Nowak & Vallacher, 2001). Nowak & Vallacher (2001) report that in the 1980s, for example, the communist regimes in several European countries were defeated when public opinion switched dramatically to pro-democratic ideologies and beliefs. A similarly dramatic shift was experienced in the next election cycle as people wearied of the consequent destabilization of existing structures. The next election again brought another cycle of dramatic change and so on as the nonlinear cycles of societal change played out on the world stage.

It seems feasible given the above examples that a very stable self-esteem may be subject to similar dynamical principles. For example, if one's self-esteem is very stable and there is a resistance to new information (e.g., one's inclusionary status is being threatened) that contradicts one's self-view, if the level of importance of that information reached a critical threshold (e.g., outright rejection by an intimate other), it may very well bring about a dramatic and sudden shift in one's level of self-esteem. Future research might test how those with differing levels of self-esteem stability are affected by changes in inclusionary status. If those with stable self-esteem resist information that contradicts their own self-view, as a dynamical model would predict, there may be a critical threshold at which a nonlinear change in self-esteem is experienced.

The results of this study also support the idea that personality factors are dynamic and likely have both adaptive and maladaptive characteristics. The literature is quite clear on the benefits of having a stable self-esteem (see Kernis, 2005 for review) but, as previous research has noted, even seemingly "positive" or "negative" personality characteristics are more complex than being just good or just bad in and of themselves. Previous studies for example have indicated there is adaptive value in "negative" characteristics such as neuroticism (Watson & Casillas, 2003), pessimism (Norem, 2003), and rumination (Martin & Tesser, 1989). Likewise, research has shed light on the maladaptive features of "positive" characteristics such as self-complexity (McConnell, Strain, Brown, & Rydell, 2009), optimism (Peterson & Vaidya, 2003) and intelligence (Sternberg, 2003). In keeping with these examples, the present studies take what can be termed a "positive" personality factor and suggest that in addition to the benefits self-esteem stability may endow on the beholder, there may also be a downside as well.

These studies demonstrate the usefulness of studying the self-system from a dynamical systems perspective, yet further research is needed to bring together dynamical principles and empirical research in this area. A fuller understanding of the complexities of the self-structure will require more in-depth analysis of self-system dynamics than was presented here. For example, time-series analysis of attractor landscape dynamics have been used in previous studies on depression (Johnson & Nowak, 2002) and attitudes (Morio, 2002) and may shed further light on the construct of self-esteem stability and its implications social functioning.

## APPENDICES

### Appendix A: Cognitive Flexibility Scale

Instructions: The following statements deal with your beliefs and feelings about your own behavior. Read each statement and respond by circling the number that best represents your agreement with each statement.

1. I can communicate an idea in many different ways.
2. I avoid new and unusual situations.
3. I feel like I never get to make decisions.
4. I can find workable solutions to seemingly unsolvable problems.
5. I seldom have choices when deciding how to behave.
6. I am willing to work at creative solutions to problems.
7. In any given situation, I am able to act appropriately.
8. My behavior is a result of conscious decisions that I make.
9. I have many possible ways of behaving in any given situation.
10. I have difficulty using my knowledge on a given topic in real life situations.
11. I am willing to listen and consider alternatives for handling a problem.
12. I have the self-confidence necessary to try different ways of behaving.

6	5	4	3	2	1
Strongly Agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree

## Appendix B: Battery of Interpersonal Capabilities

*Instructions:* The following statements deal with your behaviors in different situations. Imagine you are in a situation that calls for a particular response. Please circle the number that best describes how capable you are of that response.

1. How likely is it that you could be dominant if the situation requires it?
2. How likely is it that you could be ambitious if the situation requires it?
3. How likely is it that you could be extraverted if the situation requires it?
4. How likely is it that you could be gregarious if the situation requires it?
5. How likely is it that you could be agreeable if the situation requires it?
6. How likely is it that you could be warm if the situation requires it?
7. How likely is it that you could be trusting if the situation requires it?
8. How likely is it that you could be humble if the situation requires it?
9. How likely is it that you could be submissive if the situation requires it?
10. How likely is it that you could be lazy if the situation requires it?
11. How likely is it that you could be introverted if the situation requires it?
12. How likely is it that you could be aloof if the situation requires it?
13. How likely is it that you could be quarrelsome if the situation requires it?
14. How likely is it that you could be cold if the situation requires it?
15. How likely is it that you could be calculating if the situation requires it?
16. How likely is it that you could be arrogant if the situation requires it?

1  
Not at  
All

2

3

4

5

6

7  
Very  
much

## **Appendix C: Mouse procedure instructions**

*In this part of the study, you will be using the mouse pointer to move the cursor toward or away from the target to indicate how positive and negative you feel your self-descriptions are. As you listen to a playback of your self-description, move the cursor toward the target to indicate positive self-descriptions, and move the cursor away from the target to indicate more negative self-descriptions. When you finish listening to your playback, please press ALT F4 to stop the program. I will not be in the room, so please ring the bell to let me know when you are finished. When you are ready to start, press play and OK simultaneously and begin.*



## **Appendix D: Instructions for self-recording**

*Much of what we know about people's self-concepts has come from questionnaires where the researcher has already chosen a number of different traits, and participants are supposed to check whether or not that trait applies to them, and how much it applies to them. In addition to this, we are interested in your spontaneous self-descriptions, or how you would naturally describe yourself.*

*What we would like you to do is to describe yourself as fully and completely as you possibly can. You may want to think about it for a while, but when you start recording, feel free to just free-associate on the topic of yourself with the goal in mind that you are trying to communicate as much about yourself as possible. You may think that some self-descriptions are too bad, or socially unacceptable, and therefore you may not want to offer them. However, we are in no way evaluating you personally, and the utmost care will be taken to insure that your self-descriptions remain anonymous and confidential. In this regard, please be as frank and honest in your descriptions as you can, while at the same time stay away from physical descriptions such as your name and your physical characteristics.*

*You may speak as long as you like, but try to limit your response to 5 minutes. I will be out of the room, so your response will be completely confidential. When you are ready to start, press the Record and Play buttons simultaneously, state your subject number, and then describe yourself as fully and completely as you possibly can. When you are done, press the Stop button on the recorder and ring the bell to let me know that you are finished. Any questions?*

## Appendix E:

*Study 1 scale score ranges, means, standard deviations, and N.*

<i>Scale</i>	<i>Range of scores</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>
<i>Self-esteem level</i>	<i>13.00 to 40.00</i>	<i>31.85</i>	<i>5.44</i>	<i>149</i>
<i>Self-Monitoring</i>	<i>34.00 to 73.00</i>	<i>55.73</i>	<i>7.05</i>	<i>148</i>
<i>Self-concept clarity</i>	<i>20.00 to 57.00</i>	<i>40.27</i>	<i>9.31</i>	<i>149</i>
<i>Stability Items</i>	<i>4.00 to 16.00</i>	<i>10.76</i>	<i>2.85</i>	<i>149</i>
<i>Locus of Control</i>	<i>3.00 to 21.00</i>	<i>11.10</i>	<i>3.58</i>	<i>149</i>
<i>Need for Closure</i>	<i>96.00 to 205.00</i>	<i>159.69</i>	<i>18.46</i>	<i>149</i>
<i>Cognitive flexibility</i>	<i>36.00 to 71.00</i>	<i>56.27</i>	<i>6.11</i>	<i>149</i>
<i>Behavioral flexibility</i>	<i>32.00 to 112.00</i>	<i>81.31</i>	<i>11.63</i>	<i>149</i>

## Appendix F: Communication Flexibility Scale

Here are some situations that illustrate how people sometimes act when communicating with others. Imagine that you are in each of the situations and indicate how much your own behavior would be like that described in the scenario. If it is exactly like you, circle a 1; if it is a lot like you, circle a 2; if it is somewhat like you, circle a 3; if it is not much like you, circle a 4; and if it is not at all like you, circle a 5.

1. You are invited to give a speech about the university at a city council meeting. Everything seems fine at first, but then fifteen minutes into the speech, several members of the audience start talking to each other. You quickly end the speech and thank the group for their time.
2. Last week, you were discussing your monetary situation with your family. As the family came up with several possible solutions, you agreed that there were several different ways to address the problem and decided to consider all the possibilities.\*
3. You and a group of friends get into a discussion on gun control. After a while, it is obvious that your opinions differ greatly from the rest of the group. You explain the opposing position but agree to respect the group's opinion also.\*
4. With the whole evening free, you go to a theatre complex to see a particular movie. The ticket seller tells you that the movie is sold out but that you could buy a ticket to a later show or buy a ticket for another movie. You leave, stating that you are no longer interested in seeing any movie.
5. You are invited to a Halloween Party. Assuming it was a costume party, you dress up as the Easter Bunny. When you arrive at the party and find everyone else dressed in formal attire, you are embarrassed and decide to go home.
6. Your daily schedule is very structured. The calendar is full of appointments and commitments and when asked to make a change in the schedule, you reply that changes are impossible.
7. Discussing a roommate problem with a group of friends, you notice that many different solutions are offered. Although several of the solutions seemed feasible, you already have an opinion and do not listen to any of the alternate solutions.
8. A friend wants to discuss a problem with you at your house. When your friend does not arrive at the scheduled time, you are unable to get any work done until your friend arrives.
9. When you are shown to your seat at the football game, you notice you do not recognize anyone sitting nearby. You introduce yourself and attempt to strike up a conversation with the people sitting next to you.\*
10. You go to a party where over 50 people attend. You had a good time, but spend most of the evening talking to one close friend.
11. You are talking with a new friend, Chris, over lunch. When Chris tells you about a family problem, you decide the conversation is getting a little too personal and respond by quickly finishing lunch and leaving.
12. You are engaged in a conversation about politics at a dinner party. You disagree with everyone else's point of view and argue that everyone else is wrong. Finally, you leave the room and refuse to listen to anyone else.
13. You enjoy being with Chris, but do not enjoy Chris's habit of always interrupting you. You decide that every time Chris interrupts you, you will then interrupt Chris in order to teach Chris a lesson.
14. You are asked to give a speech at a Chamber of Commerce breakfast. Because you do not know anyone at the breakfast and would feel uncomfortable not knowing anyone in the audience, you decline the invitation.

1= exactly like me  
2= a lot like me  
3= somewhat like me  
4= not much like me  
5= not at all like me

## **Appendix G:** Calculations from raw mouse data to a self-concept dynamism index

The linear mouse procedure is a measure of self-concept dynamism. Conceptually, more dynamism over time reflects less stability in self-concept, whereas a tendency to stabilize over time reflects a more stable self-concept. A self-concept dynamism index was generated by first transforming raw mouse data into the following measures:

*Movement* – movement was calculated by subtracting the previous X-value from the current X-value (e.g.,  $X_2 - X_1$ ;  $X_3 - X_2$ ). Negative mouse movement values indicate that movement slowed between Time  $X_1$  and  $X_2$ , and positive movement values indicate an increase in movement between Time  $X_1$  and Time  $X_2$ .

*Velocity* – velocity was calculated by dividing mouse movement value by the time interval between Time  $X_1$  and  $X_2$  (i.e., 0.1).

*Absolute Velocity* – through a simple excel transform, velocity scores were transformed into absolute velocity scores.

A *self-concept dynamism* index was generated by calculating a mean velocity score for each participant from their absolute velocity scores. Higher mean velocity scores indicate higher levels of self-concept dynamism.

Thank you to my colleague, Jay Michaels, for his modifications to the original mouse procedure paradigm (Nowak & Vallacher, 1998) and for creating the “Guide to Transforming and Analyzing Mouse Paradigm Data” manual (August, 2009). His comments and suggestions for linear mouse data analysis were very helpful.

## Appendix H:

*Study 2 scale score ranges, means, standard deviations, and N.*

<i>Scale</i>	<i>Range of scores</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>
<i>Self-esteem stability</i>	<i>.50 to 9.61</i>	<i>2.97</i>	<i>1.96</i>	<i>45</i>
<i>Impulsivity</i>	<i>44.00 to 102.00</i>	<i>63.88</i>	<i>10.55</i>	<i>52</i>
<i>Self-esteem level</i>	<i>17.00 to 40.00</i>	<i>34.08</i>	<i>4.07</i>	<i>52</i>
<i>Need for structure</i>	<i>24.00 to 54.00</i>	<i>37.71</i>	<i>8.22</i>	<i>52</i>
<i>Self-concept clarity</i>	<i>18.00 to 59.00</i>	<i>43.32</i>	<i>9.55</i>	<i>52</i>
<i>Self-concept dynamism</i>	<i>3.27 to 249.63</i>	<i>50.10</i>	<i>45.68</i>	<i>51</i>
<i>Behavioral flexibility</i>	<i>41.00 to 64.00</i>	<i>53.09</i>	<i>5.69</i>	<i>52</i>
<i>Cognitive flexibility</i>	<i>43.00 to 72.00</i>	<i>58.25</i>	<i>6.24</i>	<i>52</i>

**Appendix I:**

*Study 3 scale score ranges, means, standard deviations, and N.*

<i>Scale</i>	<i>Range of scores</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>
<i>Self-esteem stability</i>	<i>.00 to 8.82</i>	<i>2.42</i>	<i>1.84</i>	<i>71</i>
<i>Self-monitoring</i>	<i>26.00 to 51.00</i>	<i>39.96</i>	<i>5.76</i>	<i>71</i>
<i>Self-esteem level</i>	<i>22.00 to 40.00</i>	<i>33.55</i>	<i>4.32</i>	<i>71</i>
<i>Action Identification</i>	<i>29.00 to 50.00</i>	<i>41.68</i>	<i>4.55</i>	<i>71</i>
<i>Need for structure</i>	<i>22.00 to 58.00</i>	<i>41.14</i>	<i>6.69</i>	<i>71</i>
<i>Self-concept clarity</i>	<i>17.00 to 52.00</i>	<i>38.40</i>	<i>8.42</i>	<i>70</i>
<i>Self-concept dynamism</i>	<i>11.81 to 186.07</i>	<i>73.00</i>	<i>52.54</i>	<i>15</i>
<i>Behavioral Flexibility</i>	<i>1.00 to 8.00</i>	<i>5.47</i>	<i>1.99</i>	<i>68</i>

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