

The Role of Temperament and Anxiety on Somatization in Young Adults

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By

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## ABSTRACT

### THE ROLE OF TEMPERAMENT AND ANXIETY ON SOMATIZATION IN YOUNG ADULTS

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The current study examined the role of temperament and anxiety on somatizing behavior in young adults (N=230). Participants completed a series of self-report measures assessing levels of behavioral inhibition, social anxiety, thought suppression, as well as a multidimensional somatization symptom profile. Gender and ethnicity were also noted as they may act to moderate the temperament-anxiety-somatization link. Analyses were carried out using a linear regression model. Results found that temperamental characteristics like neuroticism, social avoidance, and thought distortion together constituted a single factor – socio-affective vigilance. Regression analysis showed that socio-affective vigilance and low threshold were significant positive predictors of somatic behavior and anxiety in young adults. Data analysis showed that in the present sample, this relation held only for Caucasians. No ethnic differences were found on anxiety scores. While women reported significantly more somatic complaints, gender did not moderate the relation between socio-affective vigilance, low threshold, and somatization.

## 1. Introduction

Somatization is a way of displaying distress through bodily complaints. There are broad individual differences in the use of somatic complaints as a coping mechanism for life stressors. Certain innate predispositions may increase vulnerability to exhibit somatic symptoms. For example, Neuroticism has been found to reflect vulnerability to anxiety and mood disorders (Clark, Watson & Mineka, 1994). Are there other specific temperamental traits that make young adults prone to somatic behavior? The following chapter will be an overview of what somatization is, the various forms it manifests itself in, and its pervasive nature. In addition, the various models that link personality to anxiety (distress) disorders, thought suppression as a coping strategy, and gender and ethnic differences in the prevalence of somatic complaints will be reviewed. Thus, this study will investigate two research questions. First, is there a relationship between a socially anxious, inhibited temperament and somatizing behavior? Second, if such a relation exists, do gender and ethnicity moderate the presence of somatizing behavior?

### Somatization

Somatization is defined as a tendency to present pain and/or physical symptoms that are not sufficiently explained by medical conditions. It is seen as the tendency to experience and communicate somatic distress and symptoms unaccounted for by pathological findings, to attribute them to physical illness, and to seek medical help for them

(Lipowski, 1988). Somatizing behavior is often seen as an outcome of exaggerated bodily awareness, symptom preoccupation, and symptom attribution. Excessive bodily awareness involves over-concern towards one's body, while symptom preoccupation involves paying excessive attention to physical ailments. Exaggeration of the slightest bodily distress would characterize symptom attribution. *Somatizers* are aroused individuals who express their distress physiologically by channeling their "emotional" distress through their bodies. They differ from non-somatizing controls by having self-defeating, depressive, and negativistic personality traits and score higher on the dimension of neuroticism and lower on the dimension of agreeableness (Noyes et. al., 2001). Somatizers often report subjective health complaints. These symptoms experienced by the individual (e.g. abdominal pain, headache, backache, nervousness, and sleeping difficulties) are diverse and few are related to a defined diagnosis or disease. Headache was found to be the most common somatic complaint and irritability was the psychological symptom most often reported (Parsons & Wakeley, 1991). These bodily changes are believed to accompany emotions such as anxiety, frustration and the corresponding motivational states of avoiding these distressing feelings (Kirmayer & Robbins, 1991).

Moreover, somatization has been found to occur in different forms. *Functional somatization* is characterized by having a history of medically unexplained somatic symptoms which are used to obtain secondary gains in daily social functioning (Kirmayer & Robbins, 1996). Its prevalence in the general population is more common among women, those who are not married, those with less education and income, non-whites,

Hispanics and urban residents (Robbins & Kirmayer, 1991). Symptom attribution influenced by a negative affect and illness worry tends to play a role in the experience and reporting of functional somatic complaints. Children with functional somatic symptoms are usually described as conscientious or obsessive, sensitive, anxious and insecure (Beck, 2008). *Hypochondriacal somatization* can be seen as a tendency to worry about the possibility that one has or is vulnerable to a serious illness (Pennebaker & Watson, 1991). Because somatizers with hypochondriacal worry often do not explicitly complain about their irrational fears of having an illness, its prevalence is difficult to estimate. However, people with such worries tend to report nervousness, anxiety, trembling, and sleep disturbance as some of their health concerns as reported on somatic checklists (Parsons & Wakeley, 1991). Thus, anxiety about one's health and attention focused on the body is indicative of both helplessness and emotional distress, and may help to explain the presence of somatic problems.

A number of theories have been proposed to explain the genesis of somatization. Firstly, Freud's psychodynamic theory (Freud, 1962) highlights the child's repressed needs and emotions as a causal factor in the development of somatic symptoms. These complaints are seen as a psychological defense against repressed emotions, thoughts, and impulses. It could possibly be displacement of the repressed emotions into bodily symptoms, and the anxiety regarding the expression of those emotions.

Second, attachment theory claims that somatic complaints are a way for the child to maintain close proximity to the attachment figure (Bowlby, 1977). The child's expression of distress works to elicit care by the caregiver. For instance, studies have

found that an insecure attachment with a primary caregiver later manifests via personality traits and interpersonal behaviors (such as persistent care-seeking behavior) that are maintained throughout adulthood (Field, 1996). Anxious or insecure attachment promotes more intense care-seeking behavior and an early exposure to illness increases the likeliness for somatization on part of the insecure individual (Stuart & Noyes, 1999).

Third, the family systems approach frames somatizing behavior as a manifestation of maladaptive communication of distress in response to environmental stress. Illness behavior elicits caregiving responses from others and may direct attention away from other areas of conflict (Stuart & Noyes, 1999). In addition, adverse childhood experiences, like marital conflict among parents, may contribute to the development of somatizing behavior.

Finally, the social-learning theorists propose that childhood exposure to models of illness behavior, such as a parent with chronic illness, and/or physical or sexual abuse, may increase the risk for somatization (Beck, 2008). Research has found that parents of children who go on to somatize as adults may selectively reinforce somatic complaints, possibly to avoid communication about emotional states (Kirmayer, Robbins & Paris, 1994). Thus, environmental factors, above and beyond genetic factors, seem to be operative in the occurrence of somatization.

Somatization is a behavior pattern that does not appear to be time bound. Often somatic complaints are persistent over time and linger well past the potential triggering event. Somatizing can be seen as a pattern adopted by individuals to cope with demanding life events that cause emotional distress. If it is more of a coping pattern,

rather than a momentary reaction to an event, somatization could be seen as a trait-driven behavior. Alternatively, somatization could be a reflection of childhood maladjustment and dysfunctional interaction or poor attachment styles, manifesting in early adulthood reflecting more of a state dependant behavior (Burgess & Younger, 2006). Thus, it is important to explore potential temperamental characteristics that may drive somatization.

#### *Somatization as Trait-dependant: Role of Temperament*

Temperament is often defined as a substrate for personality development, consisting of basic styles of reaction and regulation that emerge early and that are closely tied to later personality dimensions. It is a biologically driven component, an innate attribute which reflects reasonably stable individual differences in activity, reactivity, and sociability (Thomas & Chess, 1977) and influences one's sensitivity and reactivity to stressful situations. Moreover, variations in temperamental traits are moderately heritable, early detectable, and constantly interact during development to shape an individual's personality (Thomas & Chess, 1977). Temperament is considered to lay the foundation for one's personality and this is a process that has both adaptive qualities and a dynamic organization (Rothbart, Ahadi & Evans, 2000).

Certain temperamental dispositions such as behavioral inhibition and neuroticism (McCrae & Costa, 1994) remain stable across time and are associated with the formation of one's personality. Research has shown that somatic complaints have been found in children who are sensitive, anxious, and emotionally reactive and who tend to perceive threat and danger, be it real or imagined, in their surrounding environment (Beck, 2008). However, these are modified and crystallized through self-generated ways of regulation

as well as environmental influences (e.g. parenting and peer relations). For instance, individuals with high negative affectivity experience consistently higher levels of distress and dissatisfaction with themselves and others and tend to emphasize the negative aspects of their daily experiences, including their health condition (Pennebaker & Watson, 1991; Vassend & Skrondal, 1999). High negative affectivity subjects are more introspective and tend to dwell differentially on their failures and shortcomings.

Cloninger's model (1986) talks about four genetically homogeneous and largely independent dimensions of temperament: novelty seeking, harm avoidance, reward dependence, and persistence. Herein, novelty seeking is a tendency to respond with intense excitement to novel stimuli and cues for potential rewards or potential relief of punishment, thereby activating or initiating behavior. Harm avoidance is defined as a tendency to respond intensively to signals of aversive stimuli, thereby inhibiting or stopping behavior. Reward dependence is a tendency to respond intensively to signals of reward, especially social rewards, thereby maintaining and continuing particular behaviors. Persistence includes a tendency to persevere with behaviors that have been associated with reward or relief from punishment. According to Cloninger's theory of personality, a temperamental profile of high novelty seeking and low harm avoidance may lead to chronic somatic anxiety and can be more specifically identified by clinical presentation of somatization. There is a positive association between high novelty seeking and somatization. Additionally, Karvonen (2006) found that harm avoidance and reward dependence are associated with increased expressions of somatization. Harm avoidance and self-directedness tend to be predictors for fatigue-related disorders. While

the former contributes to anxiety and fatigue, the latter helps reduce it (Jiang et. al., 2003).

The manner in which one perceives and attends to cues from the environment is influenced by temperamental traits such as negative affectivity and harm avoidance. These traits, in turn, may make one more prone to symptom reporting. During stressful situations, having high negative affectivity levels may lead to increased attention to bodily state and a lower threshold for pain which, in turn, could lead to increased autonomic nervous system activity, increased tension in voluntary muscles, and other physical symptoms (Vassend & Skrondal, 1999). For example, NA has been found to be moderately correlated with chest pain (Watson & Pennebaker, 1989). Similarly, intrinsic tendency to experience negative affect towards self and others could have adverse consequences on one's health (Clark, Watson & Mineka, 1994). Thus, high NA has the potential to produce somatic symptoms in the absence of disease or structural damage.

Early temperament also has the potential to shape how an individual reacts to life events (Rothbart, Ahadi & Evans, 2000). For example, behavioral inhibition (BI) has a genetic basis, can be detected early, tends to be stable across time and influences personality development (Mick & Telch, 1998). In accordance with that nature of BI, one would expect a withdrawn child to avoid most social situations, behave awkwardly when made to interact with others and display irritable mood. Research shows that a childhood history of BI may be strongly associated with adolescent (Chronis-Tuscano et al., in press) and adult (Mick & Telch, 1998) social anxiety. Inhibition or social anxiety is often marked by fear of social situations, such as public speaking. In addition, a study found

that individuals with social anxiety express less of positive emotions, pay less attention to their emotions, and have more difficulty describing their emotions (Turk et al., 2005).

Social anxiety was found to be highly co-morbid with depressive disorders, somatoform disorders and substance use disorders. Additionally, high levels of social anxiety are associated with less assertive behavior, more conflict avoidance and greater interpersonal dependency (Davilla & Beck, 2002). Moreover, research in the past has found that socially withdrawn children or adolescents reported higher levels of each internalizing problems that include: shy or withdrawn behaviors, anxiety, depressive symptoms, and somatic problems (Burgess & Younger, 2006). Those findings get support from a recent study by Nelson and colleagues (2007) noting that relatively shy emerging adults, both men and women, had more internalizing problems (e.g., anxious, depressed, low self-perceptions in multiple domains), and engaged in fewer externalizing behaviors (e.g., less frequent drinking). Thus, temperamental traits tend to drive our reactions to the environment even into early adulthood.

An innate predisposition to be withdrawn, shy and anxious is an under-the-surface mechanism that may manifest itself later in life, during adolescence and early adulthood when one is faced with a new social environment marked by new stressors and a reduction in social support from parents (Steinberg & Morris, 2001). Such a demanding context requires a young adult to develop coping skills that effectively deal with these stressors. Someone with an anxious, withdrawn nature who has difficulty expressing emotions could be at risk to exhibit somatic behavior in order to cope with the unspoken distress. It is the presence of potential triggers during late adolescence and early

adulthood that makes it important to study somatization behavior in the young population.

### *Somatization as a Distress Disorder*

Anxiety and mood disorders, both, have four basic interrelated components: affective, cognitive, biological, and behavioral, which tend to show systematic interrelations with personality (Clark, Watson & Mineka, 1994). Somatization has its roots in anxiety, and thus falls under the broad spectrum of anxiety disorders. There are various theories that have attempted to explain the relation between personality and the distress disorders. First, the *predisposition or vulnerability models* propose that personality plays a causal role in the development of distress disorders. For instance, the propensity to be withdrawn and shy could influence how the others react to such a person, thereby making him or her prone to becoming socially anxious. Similarly, a person high on extraversion and openness to experience would engage in more social and risk taking behavior while a behaviorally inhibited person would avoid social situations and be prone to internalizing problems. Pennebaker & Beall (1986) found that not disclosing personal and traumatic experiences to others may lead to disease related processes.

However a variant of this model, the *pathoplasty* model, claims that personality traits modify the course or expression of a distress disorder (Clark, Watson & Mineka, 1994). Our personality shapes the environment in ways that contribute to the maintenance of the disorder. A person high on NA would not express joy often enough and this could feed into being depressed (Pennebaker & Watson, 1991).

Next, the *complication or scar hypothesis* states that the experience of anxiety or mood disturbance causes personality changes. Lastly, the *spectrum or continuity hypothesis* postulates that both personality and a disorder reflect the same underlying process. That is, disorders are extreme manifestations of normal personality traits, or conversely, certain traits are sub-clinical expression of a disorder (Clark, Watson & Mineka, 1994).

Numerous factors have been linked to somatization in children and adults. These include insecure attachment patterns (Stuart & Noyes, 1999), high anxiety sensitivity (Muris, Vlaeyen & Meesters, 2001), maladaptive coping skills and family dysfunction (Compas et al., 1995), characteristic temperaments of low activity, low emotionality, low rhythmicity and low distractibility (Reghuthaman & Cherian, 2003), and negative moods (Melman, 2002). In addition, there is a two-way relation wherein not only emotional disturbance causes somatic behavior but frequent report of health complaints, such as chronic pain, and headaches, are predictive of future distress (McBeth, Macfarlane & Silman, 2002). Based on the *predisposition model* one would expect to see a stable personality profile that may play a causal role in one's tendency to exhibit a profile of somatic symptoms, consisting of complaints such as headaches, heavy arms and legs, poor appetite, body aches and upset stomach.

#### *Somatization as a Coping Skill: Vulnerability in Adolescence*

Adolescence and young adulthood are stages of life that are characterized by exploration and examination of the psychological characteristics of the self in order to discover “who they really are”, and how they fit in the social world in which they live

(Steinberg & Morris, 2001). Adolescence and young adulthood are accompanied by dramatic changes in one's context and are often seen as a period of difficulty.

Adolescence is characterized by the onset of puberty and its related physiological and emotional changes. For instance, early-onset puberty has been found to predispose adolescent girls to distress disorders (Steinberg & Morris, 2001; Beck, 2008). Such distress could be attributed to the hormonal changes that occur along with the bodily changes (e.g. breast development, facial hair) and to the reactions one gets from the society about appearing sexually mature. Moreover, early-maturing girls are more vulnerable to psychological difficulties and problem behavior, in general, especially when they have more opposite sex friendships (Steinberg & Morris, 2001). Some childhood traumatic experiences that affect bodily perceptions (e.g. sexual abuse) have also been found to be associated with occurrence of medically unexplained somatic symptoms (e.g. pelvic pain) in early adulthood. Thus, early childhood and adolescent experiences contribute to one's susceptibility to psychosomatic concerns later in life.

Adolescents may also have physical hypersensitivity to changes in the growing body and are prone to feeling fatigued (Viner & Christie, 2005). Research shows that unexplained abdominal pain is a common occurrence in early adolescents, while older adolescents are more likely to have headaches. Such symptoms often remain unexplained but adversely affect the young person's school, social and family life. The high level of fatigue caused by increased number of stressors during adolescence may impair school performance and peer relationships (Viner & Christie, 2005).

Accordingly, how one copes with situations during this life phase has an enduring effect into early adulthood. For example, both externalizing and internalizing behavior problems often first arise in adolescents, with the prevalence of the latter being rather consistent across early to late adolescence. Adolescence tends to be the time of onset for social anxiety disorder (Mick & Telch, 1998; Beesdo et al., 2007) suggesting that the vast majority of lifetime incidences will be evident in an undergraduate population. Moreover, a characteristic of adolescents called “intolerance to uncertainty” has been found to be a major cause of their worry and a triggering factor for anxiety disorders in adulthood (Laugesen, Dugas, & Bukowski, 2003).

*Somatization: An Emotion-focused Coping Strategy*

In recent years, evidence has accumulated that psychological distress tends to be associated with the use of emotion-focused coping strategies such as avoidance and blaming. For instance, *experiential avoidance* (Tull, Gratz, Salters, & Roemer, 2004) refers to a general tendency to avoid any aspect of internal experience evaluated as aversive, which may or may not include those internal experiences associated with a traumatic event. Experiential avoidance is associated with symptoms of depression, anxiety, and somatization, above and beyond variance associated with posttraumatic stress symptom severity. These findings by Tull and colleagues (2004) suggest that a tendency to avoid internal experiences (with a particular focus on emotions) may contribute to the presence of general psychiatric symptoms among individuals. In addition, a recent meta-analysis of coping strategies and their effects on distress has found that *emotion-focused* coping methods such as somatizing are significantly

correlated with increased psychological distress (Littleton, Horsley, John & Nelson, 2007). It has also been demonstrated that the suppression of emotional expression is associated with increased physiological arousal (Gross and Levenson, 1997) and somatization is often seen as a physical manifestation of internal suffering.

Similarly, thought suppression refers to the process of consciously trying to prevent specific classes of thoughts from entering the stream of consciousness (Wegner, 1989 as cited in Spinhoven & Does, 1999). The White Bear Suppression Inventory (WBSI, Wegner & Zanakos, 1994) assesses one's tendency to suppress thoughts across a variety of situations and scores on the WBSI are found to be positively correlated with measures of emotional vulnerability and measures of depressive and anxious affect (Spinhoven & Does, 1999). Studies have shown that neurotic psychopathology is positively associated with thought suppression (Wegner & Zanakos, 1994; Purdon, 1999). Thought suppression may be a product of anxiety and could work as a coping strategy to deal with psychosocial stress. Hansell & Mechanic (1986) found that the tendency to introspect shows increased reports of both emotional and somatic symptoms. However, in general, somatizers are likely to attribute common somatic symptoms to environmental causes and less likely to attribute them to emotional distress (Kirmayer & Robbins, 1996). Somatizers, who report multiple medically unexplained symptoms, may do so due to excessive attention they pay to their body and self (Kirmayer & Robbins, 1991). As such, somatic complaints may be a product of high sensitivity towards environmental stimuli and people with high awareness about self and the external world may report more medically unexplained symptoms.

### *Gender Differences in Somatization*

Gender may influence the reporting of somatization. For example, young adolescent girls may be particularly inclined to perceive their health status through the prism of their socioemotional needs (Terre & Ghiselli, 1997). Girls are more prone to experience internalizing problems and therefore may be more prone to developing somatic symptoms (Burgess & Younger, 2006). For instance, in a study with adolescents (12-17 yrs), more girls than boys received the diagnosis of social phobia and the frequency of the disorder increased with age (Essau, Conradt, & Petermann, 1999).

A strong correlation between somatic symptoms and emotional distress was found in both sexes, with females reporting more somatic symptoms at each level of emotional distress (Piccinelli & Simon, 1997). Furthermore, Haugland and colleagues (2001) found that girls reported more symptoms than boys and these gender differences increased with age. It has been argued that women and girls are more aware and sensitive to their bodies, more accepting of a disease status and more willing to talk about experienced symptoms.

Gender differences in somatization may be due to differences in symptom perception and appraisal. There is evidence that females tend to use more situational and circumstantial clues in evaluating bodily sensations compared with males (Piccinelli & Simon, 1997). Such a tendency might influence the intensity with which symptoms are experienced and result in females endorsing more somatic symptoms than males, especially when symptoms are relatively mild, vague and ambiguous. Moreover, the association between somatic symptoms (e.g. headache, abdominal pains) and psychological symptoms (e.g. depression, illness worry) seen more often in women,

could also be due to their vulnerability to the 'reporting bias' resulting from a tendency to over-report both types of symptoms (Piccinelli & Simon, 1997). Thus, women seem to be more aware of what they experience and tend to express themselves, explicitly or through somatic complaints.

### *Cultural Differences in Somatization*

Somatic symptoms may be a way of communicating social and personal concerns that are culturally inappropriate to voice by calling attention to bodily distress. Sex-specific differences in cultural norms, social aspirations and roles, and stigmatized expression of emotional distress could promote higher levels of functional somatic symptoms among certain cultural and social groups. For instance, feelings of heat in the head or of worms crawling in the head are common in equatorial Africa and Asia, as climatic conditions and the prevalence of parasitic disease make these symptoms salient (Kirmayer, Robbins & Paris, 1994). Similarly, it has been found that conversion-type symptoms (e.g. lost feeling in arm or leg, paralysis, lost voice, blindness, amnesia) are common in orthodox cultures like India, and these examples best account for possible cultural differences in somatic expression of emotional distress (Piccinelli & Simon, 1997).

Cross-cultural differences found by studying social factors influencing somatization reveal that the expression of somatic complaints is an integral aspect of emotional and cognitive experience in certain cultural groups. For example, somatic problems among Hispanics are common as they use their body as a channel of self-expression and convey pain in order to make sense of their suffering (Koss, 1990). The

belief that emotion is an indicator of weakness could motivate them to suppress their feelings. This may lead to its expression through somatic symptoms (Robbins & Kirmayer, 1991). Overall, cultural research suggests that somatic symptoms are very common but often limited in their expression. Interestingly, complaints cut across different diagnostic conditions, to become the final common pathway through which emotional disturbances, psychiatric disorder (e.g. anxiety and mood disorders), and organic pathology all express themselves (Kirmayer, Robbins & Paris, 1994).

In many Asian societies, the body is holistically integrated with emotions. The distress display rules and expressions of distress through the body is the cultural norm within many Asian cultures. Therefore, one expects to see higher somatic distress in people from Asian countries even in non-clinical groups (Saint Arnault et al., 2006). However, Mumford (1989) had found no support for the notion that Asian subjects generally experience more somatic sensations associated with psychological distress than Western subjects. Ethnographic research has revealed that Asians have a tendency to experience negative, depression-like emotions as symbolic and holistically interrelated with somatic sensations and interpersonal disharmony, suggesting an inclination to endorse a variety of somatic distress symptoms. The Japanese had higher somatic distress means than Americans. Some clinical and ethnographic studies also suggest that the somatic distress symptoms included in Western instruments (sleep, appetite and lethargy) may not be sufficient to capture the somatic distresses experienced by people in Asian samples (Saint Arnault & Kim, 2008).

## Rationale of the study

Why do people somatize? The mind and body are intricately linked. When the mind is troubled, it is reflected through one's mood and body language. For instance, the body shivers out of anger or fear; and the heart pounds when scared or anxious. In general, an intense emotional experience is often accompanied by physiological reactions. As discussed, somatic problems, such as pain, can be both indicative and predictive of mental distress (McBeth, Macfarlane & Silman, 2002). Curtailing one's emotions could lead to displacement of its intensity and it may develop into a bodily symptom. Somatic symptoms are often multiple, persistent and disabling in their nature (Wessely & White, 2004). However, the temperamental factors that contribute to the occurrence of functional somatic symptoms are not fully understood. Does a certain temperamental disposition navigate emotional regulation in a dysfunctional way, such that it leads to displaying somatic symptoms with no medical explanation for it? It is important to study somatization as somatic behaviors could hamper daily functioning when practiced often and they have the potential to promote emotional problems in the future.

Past research has found that certain personality traits like neuroticism make one prone to somatic behavior (Vassend & Skrondal, 1999). First, is this association limited to a single trait or are there multiple temperament dimensions that make one vulnerable to somatizing? Second, are there clusters of somatic complaints that are common products of traits such as social anxiety? Past studies have examined specific somatic complaints individually, such as skin allergy (Besiroglu et. al., 2008), abdominal pain (cited in Beck,

2008). However, there is a paucity of literature on a profile of somatic complaints. A somatizer would likely use numerous symptoms to express his/ her distress. As such, it appears artificially limiting to examine only a single symptom. This would likely decrease the ability to effectively capture the extent of somatic complaints.

In addition, thought suppression has been associated with somatic distress. Previous research has found that thought suppression predicts internalizing disorders, including somatizing behavior (Purdon, 1999). Thought suppression has also been found to be positively linked to emotional vulnerability and anxious affect (Wegner & Zanakos, 1994). However, a few studies have found that thought suppression is independent of psychopathology, such that it doesn't differ between patients with anxiety disorder, affective disorder or no psychiatric diagnosis (Spinhoven & Does, 1999). Further, people who face difficulty in distinguishing between feelings and bodily sensations have been found to show a high tendency to report somatic symptoms (De Gucht, Fischler & Heiser, 2004). Thus, the tendency to experience anxiety, negative emotions (Neeleman, Bijl & Ormel, 2004), thought suppression (Purdon, 1999) and have acute awareness of bodily sensations (Kirmayer & Robbins, 1991) seems to make an individual prone to somatizing behavior. However, little is known concerning the potential interrelations between neuroticism, social avoidance and thought distortion in somatization.

As discussed, there is strong evidence for a link between temperament and somatization. It has also been found that avoidance, both in thoughts and behavior, increases psychological distress, which then expresses itself in form of bodily complaints (Tull et al, 2004). Thus, it may be that variations in somatization in a non-clinical

population are an expression of avoidance – avoidance that is arising out of individual differences in social anxiety. Moreover, there is a paucity of literature on the potential risk factors for occurrence of various somatic symptoms (Beck, 2008) and research is yet to uncover temperamental factors that make one vulnerable to distressing, somatic complaints, with no physiological cause behind them. This study was unique as it attempted to identify temperamental dimensions that are associated with a wide set of somatic complaints.

In the current study, young adults' temperamental characteristics were assessed in order to examine somatic behavior during everyday social situations. Avoidance behavior was measured through a thought suppression scale. Social anxiety and behavioral inhibition (BI) levels were also examined through standardized psychometric measures. Temperament was tapped through a factor, labeled socio-affective vigilance, which was created from the individual measures of neuroticism, social anxiety and thought suppression collected as part of the study. Past research attempting to identify temperamental factors that make individuals vulnerable to somatic problems have not had conclusive findings. The present study attempted to understand what characteristics apart from neuroticism (Watson & Clark, 1992) make individuals prone to somatic behavior. Somatization was assessed through a checklist of somatic complaints. Unlike previous studies, this study examined a set of somatic complaints that included headaches, heavy arms/legs, muscle pains, upset stomach/bowels, cramps and nausea. Gender and ethnicity were also examined as potential moderators in this relation.

Research Question 1: Does the temperamental factor, socio-affective vigilance, predicts an increase in an individual's risk to exhibit somatizing behavior? Does low threshold for environmental stimuli contributes to this prediction?

It was hypothesized that a temperamental factor socio-affective vigilance is predictive of increased levels of somatization. In addition, individuals with low threshold or high sensitivity towards body sensations and external stimuli would exhibit more somatizing behavior.

Research Question 2: Do gender and ethnicity moderate the link between temperament and somatization?

Due to disproportionate representation of ethnic groups in the sample, the five groups were collapsed to two, i.e. Caucasians and Others (Hispanics, Asians and African-Americans). It was hypothesized that females and non-Caucasians would tend to use somatic complaints as coping skills more often than their counterparts. Also, ethnicity and gender would interact with socio-affective vigilance and low threshold in predicting somatic behavior.

## 2. Method

### *Participants*

For the purpose of the present study, undergraduate participants were recruited from the undergraduate psychology research pool at George Mason University (GMU). 300 undergraduate students responded to the online survey created for this study. Students were excluded from the study based on poor participation and age. Firstly, individuals who took less than 20 minutes to complete the full battery were excluded, based on pilot testing showing that this was the minimum time required to thoughtfully answer all the questions. Secondly, as the study is about young adults, participants less than 18 years old and greater than 23 years old were also excluded from analysis. The final sample included data from 230 participants who met these criteria.

The participants excluded from the sample did not differ from the remaining participants on a number of key factors. Individuals excluded due to short duration did not differ on age, as the included group's mean was 20.51 (S.D. = 4.46) and the excluded group's mean was 20.6 (S.D. = 2.45),  $F(2,297) = 1.674$ ,  $p = 0.197$ . These groups also did not differ across gender,  $\chi^2 = 0.015$ ,  $p = 0.90$  and ethnic groups,  $\chi^2 = 0.017$ ,  $p = 0.89$ . The excluded group created based on age was found to differ significantly across gender,  $\chi^2 = 7.94$ ,  $p = 0.005$ , and ethnicity,  $\chi^2 = 5.6$ ,  $p = 0.018$ . As such, the final group used for

data analysis differed from all excluded, in terms of both gender ( $\chi^2 = 4.47, p = 0.034$ ) and ethnicity ( $\chi^2 = 4.17, p = 0.04$ ). The final sample was more likely to be more female and more Caucasian than the original 300 participants.

### *Demographics*

Self-reported variables were included in the analysis. These included gender and ethnicity. Ethnicity was assessed with the item: “Choose your ethnicity as 1. Asian/Pacific Islander, 2. Hispanic, 3. White, Non-Hispanic, 4. African-American/Non-Hispanic, and 5. Native American”, and respondents were able to choose only one of the five categories. This variable was later dichotomized (Caucasian versus non-Caucasian) for analysis. The characteristics of the sample are presented in Table 1.

### *Procedure*

Seven questionnaires were used to collect data on demographic information, behavioral inhibition, social anxiety, thought suppression and somatic complaints. All the questions were entered into Sona Systems and a study was created under the name of ‘Personality Study’. This was open for the undergraduate students of GMU to participate in and earn 1 credit for their participation. An online consent was taken by the participants and confidentiality was assured.

### *Measures*

**Adult Temperament Questionnaire** (ATQ, Rothbart, Ahadi, Evans, 2000) is a 77-item scale adapted from the Physiological Reactions Questionnaire developed by Derryberry and Rothbart (1988). The instrument addresses three general constructs of

effortful control, negative affect, and orienting sensitivity. These come from items that make the 13 sub-factors, which are rated on a scale from 1 (extremely untrue) to 7 (extremely true) and then averaged to create the factor score. The ATQ factors were found to correlate well with the Big Five scales. There was a negative correlation between effortful control and Neuroticism ( $r = -.41$ ). The negative affect factor score was highly correlated with Big Five Neuroticism ( $r = .74$ ), orienting sensitivity with Big Five Intellect/Openness ( $r = .65$ ), temperamental Extraversion/Surgency with Big Five Extraversion ( $r = .67$ ), and Affiliativeness with Big Five Agreeableness ( $r = .69$ ). The Effortful Control factor score was highly correlated with Big Five conscientiousness ( $r = .64$ ), while also having a substantial negative correlation ( $r = -.41$ ) with Big Five Neuroticism. Aggressive negative affect is less related to harm avoidance ( $r = .30$ ) than is non-aggressive negative affect ( $r = .53$ ) (Evans & Rothbart, 2007).

**Adult Measure of Behavioral Inhibition** (AMBI, Gladstone & Parker, 2005) is a 16-item instrument developed to measure subjective reports of contemporaneous trait inhibition. Items included responses such as hyper-vigilance, non-approach, nervousness, physiological anxiety, observing unfamiliar people from a safe distance, reluctance to initiate social contact, and novelty and risk avoidance. The instrument provides a dimensional measure after averaging items scored on a 3-point scale (0 = *no/hardly ever*; 1 = *some of the time*; 2 = *yes/most of the time*). Internal consistency was estimated using Cronbach's  $\alpha$ . The  $\alpha$  coefficients for subscales of the AMBI ranged from 0.52 (risk avoidance) to 0.86 (fearful inhibition) and 0.87 for the total score. Simple and partial correlations were computed between subscales belonging to each measure. For the AMBI,

fearful inhibition was correlated positively with low sociability ( $r = 0.51, p < 0.01$ ), non-approach ( $r = 0.48, p < 0.01$ ) and risk avoidance ( $r = 0.47, p < 0.01$ ). Non-approach was correlated positively with risk avoidance ( $r = 0.37, p < 0.01$ ) and with low sociability ( $r = 0.29, p < 0.01$ ). Low sociability was correlated with risk avoidance ( $r = 0.31, p < 0.01$ ). The test-retest reliability coefficient was 0.69 for the total score and ranged from 0.56 to 0.72 for the subscales ( $p < .001$ ).

**Retrospective Measure of Behavioral Inhibition (RMBI)** (Gladstone & Parker, 2005) is an 18-item instrument for the retrospective reporting of remembered inhibited behavior in childhood. It is constructed to capture behavioral reactions and responses such as: hiding; withdrawing; fearfulness; clinging to a familiar base; reticence; reduced mobility; crying; standing back; freezing in response to unfamiliarity; and avoidance of risk activities. Measures are rated on a 3-point scale (i.e., 0 = *no/hardly ever*; 1 = *some of the time*, or 2 = *yes/most of the time*) and items are summed to create total dimensional scores. The RMBI is the measure of key interest for the present study, used to investigate the relationship between reports of childhood inhibition and later anxiety. The  $\alpha$  coefficients for RMBI subscales ranged from 0.40 (risk avoidance) to 0.87 (non-approach) and 0.90 for the total score. For the RMBI, non-approach was positively correlated with shyness and sensitivity ( $r = 0.64, p < 0.01$ ), fearful inhibition ( $r = 0.59, p < 0.01$ ) and risk avoidance ( $r = 0.36, p < 0.01$ ). Fearful inhibition was correlated with shyness and sensitivity ( $r = 0.59, p < 0.01$ ) and, to a lesser degree, risk avoidance ( $r = 0.29, p < 0.01$ ). Risk avoidance was similarly positively correlated with shyness and sensitivity

( $r = 0.31$ ,  $p < 0.01$ ). The test retest reliability coefficients ranged from 0.41 ( $p < 0.01$ ) to 0.85 and 0.66 for the total score.

**White Bear Suppression Inventory (WBSI)** (Wegner and Zanakos, 1994) is a 15-item, self-report measure designed to assess the extent to which individuals suppress and experience the intrusion of thoughts. Prior, factor analyses of the WBSI revealed a one-factor solution. Furthermore, the WBSI was found to correlate positively with measures of emotional vulnerability and psychopathological symptoms. The WBSI has strong test-retest reliability ( $r = 0.80$ , Muris, Merckelbach & Horselenberg, 1996) average  $r = 0.77$ , Wegner and Zanakos, 1994). WBSI was included in the present study to assess a form of experiential avoidance. Internal consistency of the WBSI was good,  $\alpha = 0.89$ .

**Social Anxiety Scale – Adolescents (SAS-A)** (LaGreca & Lopez, 1998) contains 22 items where 18 items are self-statements such as "I worry about what others think of me", and four are filler items (e.g., "I like to play sports"). Each item is rated on a 5-point Likert scale according to how much the item "is true for you", ranging from 1 (not at all) to 5 (all the time). The SAS-A consists of three factorially derived subscales: Fear of Negative Evaluation (FNE), Social Avoidance and Distress-New (SAD-New), and Social Avoidance and Distress-General (SAD-General). FNE reflects fears, concerns, and worries regarding negative evaluations from peers (8 items; e.g. "I worry about what others think of me"). SAD-New assesses anxiety in and avoidance of new social situations (6 items; e.g. "I get nervous when I meet new people"), whereas SAD-General assesses general social anxiety or avoidance (4 items; e.g. "It's hard for me to ask others to do things with me"). Items are summed to compute total and subscale scores with

higher scores reflecting greater social anxiety. Sound psychometric data exist for the SAS-A, including good internal consistency (subscale alphas = 0.70 - 0.89) and the ability to discriminate between adolescents with and without social phobia (La Greca & Lopez, 1998).

**Behavioral Inhibition Scale - Behavioral Activation Scale (BIS/BAS, Carver & White, 1994)** is a 24-item scale based on a general conceptualization of Gray's theory of emotional systems. The scale can be broken down into four separate subscales. The BIS scale measures distress over possible negative occurrences and sensitivity to such events as they occur. The three remaining subscales measure the BAS according to reward responsiveness, drive and fun seeking. The BIS/BAS exhibits high internal consistency and adequate test-retest reliability (Carver & White, 1994). Test-retest correlations were .66 for BIS, .66 for Drive, .59 for Reward Responsiveness, and .69 for Fun Seeking. The BIS was highly correlated with other measures such as Manifest Anxiety Scale (MAS,  $r = 0.58, p < .001$ ) and MacAndrews & Steele BIS ( $r = 0.59, p < .001$ ). Also, the subscales of BAS were found to moderately correlate with other pertinent measures of extraversion and anxiety; MAS extraversion scale was correlated with drive ( $r = 0.41, p < .001$ ), reward ( $r = 0.39, p < .001$ ) and fun seeking ( $r = 0.59, p < .001$ ).

**Symptom Questionnaire (SQ, Kellner, 1987)** consists of 92 Yes/No items, out of which 68 items indicate anxiety, depression, anger-hostility and somatic symptoms. 24 items are antonyms of some of the symptoms to indicate corresponding well-being scale. The scores on the somatic and anxiety scales of the SQ will serve as the outcome behavior of interest (see tables 4 and 5). The correlation coefficients obtained between

SQ and the Hopkins Symptom Checklist ranged from 0.39 for anger-hostility to 0.86 for depression (median, 0.63 for anxiety). The  $p$ -value for these coefficients was .001 (Kellner, 1987). The split-half reliability of the scales was as follows: anxiety, 0.75 to 0.95 (median, 0.83), depression, 0.74 to 0.93 (median, .091), somatic, 0.57 to 0.84 (median, 0.78), hostility, 0.78 to 0.95 (median, 0.89). The test-retest correlations (4 week period) were as follows: anxiety, 0.71 ( $p < .001$ ); depression, 0.95 ( $p < .001$ ); somatic, 0.77 ( $p < .005$ ); and hostility, 0.82 ( $p < .001$ ), suggesting that SQ scales are reliable.

#### *Data analysis*

The data obtained from the participants were graphed for the categories of gender and ethnicity on the mean  $Z$ -scores of the two outcome variables, somatic complaints and anxiety (see figures 2 and 3). Females reported significantly higher anxiety scores than males,  $t(228) = 1.96, p = .05, d=0.19$ . However, there was no significant difference on somatic scale,  $t(228) = 1.49, p = .135, d=0.16$ .

In terms of ethnicity, there was a trend for a group difference on the anxiety scale,  $t(228) = 1.91, p = .058, d=0.18$ , with Caucasians receiving higher scores than non-Caucasians. However, there was no difference on the somatic scale,  $t(228) = 0.414, p = .68, d=0.08$ .

Zero-order Pearson correlations were computed for scores on three subscales of Symptom Questionnaire and all were found to be significantly correlated with each other (see Table 2). Scores obtained on BIS and BAS were poorly correlated with other measures and were found not fit for any model. Thus they were not used in analysis.

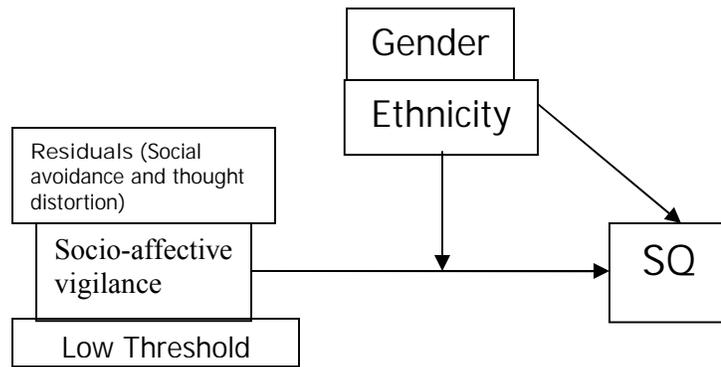
In order to answer the research question 1, based on theoretical understanding of the temperamental characteristics that tend to predict somatizing behavior, four primary factors were created from the items of the questionnaires completed by the participants. These factors were neuroticism, social avoidance, thought distortion and low threshold. Here neuroticism was defined as the *emotional* aspect of an individual wherein there is feeling of worry, anxiety, suspicion and uncertainty. This factor consisted of 19 items (see table 5) and had an internal consistency (alpha) of .83. Social avoidance was the *behavioral* aspect that reflects in an individual's actions of avoiding people, places and unfamiliar situations. This factor was made up of 11 items (see table 6) and had an alpha of .74. Thought distortion can be seen as the *cognitive* characteristic of a somatizer where there are disturbing thoughts, negative evaluation of situations and people around self. It consisted of 17 items (see table 7) with an alpha of .82. And, low threshold was defined as the *perceptual* quality of an individual, of being very sensitive and highly aware of the slightest change in one's environment. This factor had 8 items (see table 8) with an alpha of .57.

Next, a correlation matrix was generated between these four factors. It was found that 3 factors out of 4 correlated significantly with each other (see table 9). Therefore, there was a possibility of commonly shared variance among these factors. Keeping in mind that exploratory factor analysis (EFA) is a data reduction technique, factor analysis was run on the four factors, and a general factor was obtained. This factor was composed of 0.97 common variance shared by the four primary factors. The EFA output showed that KMO Measure of Sampling Adequacy was .64 indicating that factor analysis could

be useful for this data. The Bartlett's Test of Sphericity was found to be significant indicating that EFA was appropriate. Reviewing the scree plot, there were two factors with an Eigen value greater than one (see figure 4). The factor plot indicated that Neuroticism, Social Avoidance and Distorting Thoughts are loading high on factor 1 while Low Threshold contributing nearly nothing to this factor. The first factor was named as socio-affective vigilance, reflecting the underlying cognitions and behaviors that went into the original composite factors.

The factor was saved as standardized scores for use in the regression model. In addition, the standardized residuals were saved for each of the primary factors. These were named ZResNeuroticism, ZResSocAvoid, and ZResDistThots. As such, there were 5 potentials predictors for a regression model with Somatic and Anxiety scores from the SQ as dependant variables.

To answer the question concerning moderating effects of gender and ethnicity, both categorical variables were dummy coded for use in a regression model: 1 = male, 0 = female and 1 = Caucasians, 0 = others (Hispanics, Asians and African-Americans) and entered into the model. Then, interaction terms were computed between the predictor 'socio-affective vigilance' and the dummy coded moderator variables for inclusion in the Multiple Linear Regression model.



*Figure 1*  
Figure showing the regression model with the predictors, moderators and outcome.

### 3. Results

#### *Regression analysis*

Two multiple linear regression analyses were conducted to examine the full model. The *socio-affective vigilance* factor was used in the regressions along with the z-score of low threshold and the residuals of neuroticism, social avoidance, and distorting thoughts. For each analysis, the predictors were entered stepwise into the regression equation in the following order: (i) *socio-affective vigilance* (from the EFA), (ii) low threshold, (iii) residuals of social avoidance and thought distortion, (iv) Caucasian, (v) *socio-affective vigilance* x Caucasian, (vi) gender, and (vii) *socio-affective vigilance* x gender. The dependant measures were (a) somatic and (b) anxiety scores. Predictive measures were standardized to z-scores for use in the regression. The results of the regression analyses are presented in Table 10.

When predicting somatic behavior, the full model accounted for 20.4% of the total variance,  $F(8,229) = 7.087$ ,  $p < 0.001$ . *Socio-affective vigilance* significantly predicted somatic behavior, accounting for 8.5% of the variance,  $\Delta F(1,229) = 21.05$ ,  $p < 0.001$ . The primary factor of low threshold also significantly predicted somatic behavior, accounting for 5.8% of the variance,  $\Delta F(1,229) = 15.59$ ,  $p < 0.001$ . The residuals of social avoidance and thought distortion together accounted for 2% of the variance,

$\Delta F(1,229) = 2.7, p = 0.069$ . a simple effect of residuals of thought distortion was also found,  $t(1,229) = 2.26, p < 0.05$ , indicating that influence of thought distortion on somatizing behavior above and beyond *Socio-affective vigilance* and low threshold.

The main effects of gender and ethnicity were not significant. However, the interaction effect with ethnicity significantly accounted for 3.2% of the variance,  $\Delta F(1,229) = 9.106, p < 0.005$ . This interaction has been depicted in Figure 5. To examine this finding, separate zero-order correlations between *socio-affective vigilance* and somatic scores were calculated for Caucasians and others. Caucasians showed a significant positive relation,  $r(133) = 0.416, p < 0.01$ , while others (Hispanics, Asians and African-Americans) showed no relation,  $r(97) = 0.067, p = 0.51$ . There was no significant interaction with gender,  $\Delta F(1,229) = 0.329, p = 0.567$ .

When predicting anxiety, the full model accounted for 29.5% of the total variance,  $F(8,229) = 11.567, p < 0.001$ . The *socio-affective vigilance* factor significantly predicted anxiety, accounting for 23.5% of the variance,  $\Delta F(1,229) = 69.87, p < 0.001$ . The primary factor of low threshold accounted for 1.5% of the variance,  $\Delta F(1,229) = 4.43, p < 0.05$ . The residuals of neuroticism, social avoidance and thought distortion together also significantly predicted anxiety, accounting for 3.2% of the variance,  $\Delta F(1,229) = 4.99, p < 0.01$ . The main effects of gender and ethnicity were not significant, nor were their interactions (see table 10).

#### 4. Discussion

This study set out to examine whether underlying temperamental factors – socio-affective vigilance and low threshold increase an individual’s risk to exhibit somatizing behavior. The temperamental factor here labeled socio-affective vigilance consisted of neuroticism, social avoidance and thought distortion. The findings suggest that college-going young adults high on socio-affective vigilance and low threshold for bodily sensitivity are likely to report more somatic complaints on a daily basis. This is particularly true in women and Caucasian students.

Somatization is the tendency to present pain and/or physical symptoms that are not sufficiently explained by medical conditions. The mechanisms underlying somatization are poorly understood. Until now, there have been few studies that have examined the link between temperament and somatization (Karvonen et al., 2006). Past research suggests that anxiety and negative affect are the underlying psychological states most closely linked to somatization. People prone to worrying and emphasizing negative aspects of daily life tend to report somatic concerns (Vassend & Skrondal, 1999). Similarly, Melman (2002) found that negative moods are positively associated with somatic complaints. Moreover, somatic complaints are particularly common in individuals with poor coping skills and high levels of helplessness and hopelessness,

characteristics common to anxiety and depression (Eriksen & Ursin, 2002). In this study, the participants were young college-going adults who face stress and decision-making on a daily basis.

Negative affect was found to be the strongest predictor of medically-unexplained symptoms (De Gucht et al., 2004) and was indicative of the co-occurrence of psychological distress and somatic distress. Neuroticism as a single factor has been consistently linked to somatic problems in both, clinical and non-clinical populations (e.g. Neeleman, Bijl & Ormel, 2004). Furthermore, earlier findings have suggested that neuroticism and harm avoidance are good predictors of somatic behavior. However, the present study attempted to understand whether socio-affective vigilance, a more expansive characterization of underlying traits, helps predict somatic behavior in young adults.

Previous research has shown that individuals who are socially avoidant tend to suppress thoughts about social situations that require interaction with others. Both behavioral inhibition (Chronis-Tuscano, in press) and thought suppression (Purdon, 1999) have been independently found to promote internalizing disorders. Burgess and Younger (2006) have found that socially withdrawn adolescents reported higher levels of internalizing problems, including somatic complaints. Beck (2008) noted that adolescents who use cognitive restructuring or distraction of thoughts cope with their emotional arousal by presenting somatic symptoms. The present findings indicated that the socially anxious/ avoidant individuals tend to be high on thought suppression and neuroticism. In

fact, this single factor, socio-affective vigilance was found to interact with the Caucasian group to act as a strong predictor of somatic behavior for the present sample.

Based on the current study, there is sufficient evidence that *socio-affective vigilance*, as consisting of shared elements of neuroticism, social avoidance, and distorting thoughts, may act as a personality disposition and motivational style that makes young people prone to reporting somatic symptoms in daily life. Furthermore, socio-affective vigilance may be driven by an underlying anxious temperament, as it was also found to be a significant predictor of anxiety scores for the sample. These data add to the model for understanding the occurrence of somatizing behavior among young adults by demonstrating a core underlying factor that appears to cut across emotional, cognitive, and behavioral predictors of risk. However, more research needs to be done with larger, heterogeneous samples from different populations to substantiate the claim.

In addition, people who have high awareness of their body, or in other words, have a low threshold for bodily sensations (e.g. Eriksen & Ursin, 2002), have shown vulnerability to somatic complaints. This study distinctively attempted to understand the role of low threshold/ high sensitivity in making individuals prone to somatic problems. Low threshold was studied as a predictor of somatization separately from socio-affective vigilance. People who are highly aware of their bodies and environments would be inclined to react more explicitly to stimuli and communicate distress through somatic symptoms. The findings show that even with an alpha of 0.57, the low threshold factor had a strong effect in predicting somatic concerns among participants. One must keep in mind that low threshold could in fact be a better predictor of somatic behavior if the alpha

was improved. Here, it is explaining almost equal amount of variance in somatic behavior as being accounted by socio-affective vigilance factor. Thus, strengthening the inter-item consistency of this factor by assessing it with more relevant items could lead to a better understanding of the relationship than our model is already predicting.

Results also indicate that the residual of thought distortion was found to have a simple effect on somatizing behavior in the sample, above and beyond the socio-affective vigilance and low threshold factors. Thus there is some amount of unique variance being accounted by the thought distorting tendency in somatizing individuals, and its role needs to be explored further.

Past research has shown that girls have had a statistically significantly greater prevalence than boys on psychosomatic complaints (e.g. Piccinelli & Simon, 1997; Essau, Conradt, & Petermann, 1999) and anxiety (Feingold, 1994). Males and females did differ in their reported levels on both anxiety and somatic complaints; however that difference did not affect the predictive nature of the temperamental factor socio-affective vigilance. Contrary to expectations, in this study, gender was reported to be an insignificant moderator in the regression model for predicting anxiety and somatic complaints. However this may be due to the fact that females were overrepresented in the sample (85%).

Somatizing is often seen as a way of displaying distress through bodily symptoms, acting as an alternative pathway for emotional expression. Cultures differ in their ways of emotional expression, which may then affect patterns and levels of somatization. Previously, Kirmayer et al. (2004) noted that often the origins of somatic

distress lie within the socio-cultural context. This study also found that ethnicity was indeed associated with somatization. Earlier studies have shown that Hispanics (Koss, 1990) and Asians (Saint Arnault et al., 2006) are more prone to somatization. In the current study, ethnicity acted a crude proxy as we were really interested in the socio-culturally shared behaviors and expectations that shape somatization. However, culture was reported as a demographic characteristic of the participants which did not serve what we were looking to tap. Thus, contrary to previous findings, the present results found that Caucasians when showing socio-affective vigilance reported more somatic problems than other ethnic groups. Again, this could be due to the disproportionate representation of the ethnic groups in the sample.

### *Limitations*

The extent to which the findings can be generalized is limited for various reasons. Firstly, the data are collected from an undergraduate pool and are restricted to the college population sampled. Secondly, students may have responded in a biased fashion. Self-report data are usually susceptible to personal biases, distortion in recall (Stone & Shiffman, 2002), and shared method variance. The disproportionate representation of males and females could also reflect systematic biases in the likelihood to participate in research. Thirdly, the disproportionate sample sizes in the gender and ethnic categories could have led to the unexpected pattern of results. Lastly, somatization is believed to have some foundation in familial factors (Karvonen et al., 2006) and this study was unable to reach any understanding of family influences. An interview schedule with the participants' family member would have not only validated their self-report but also told

us about the role of family environment in promoting somatizing as a coping skill. Also, an interview to tap the socio-culturally shared behaviors would have given a better understanding of culture's role in somatization.

### *Strengths*

This study attempted to reach a better understanding of temperamental characteristics that promote somatic behavior in young adults. It worked on the assumption that somatization involves more than just 'seeking attention' through somatic complaints. It is highly possible that somatizing is a mechanism to cope with one's inabilities in social situations and poor self-expression. Moreover, there is more than one temperamental factor that contributes to somatic behavior. Along with neuroticism, cognition plays an important role in form of thought suppression/ distortion and social avoidance behavior in producing somatic complaints. Somatic behavior is not limited to one or two somatic complaints but entails a variety of somatic complaints that were successfully measured in this study through a comprehensive symptom checklist. Results have made us aware that socio-affectively vigilant individuals are susceptible to somatic behavior.

Table 1  
 Table showing demographic characteristics of the sample

<b>Ethnicity</b>	Total (N=230)	Males (N=34)	Females (N=196)
White	133	16	117
Asian	55	12	43
African-American	23	5	18
Hispanic	18	1	17
Native American	1	0	1

Table 2

Table showing zero-order correlations between three subscales of the Symptom Questionnaire

<b>SQ Scales</b>	Somatic	Anxiety	Depression
Somatic	1.00		
Anxiety	<b>0.63**</b>	1.00	
Depression	<b>0.53**</b>	<b>0.73**</b>	1.00

\*\*p < 0.01.

Table 9  
Zero-order correlations between the four primary factors

<b>Factors</b>	Neuroticism	Social Avoidance	Thought Distortion	Low Threshold
Neuroticism	1.00			
Social Avoidance	<b>0.652**</b>	1.00		
Thought Distortion	<b>0.539**</b>	<b>0.396**</b>	1.00	
Low Threshold	0.024	0.011	0.056	1.00

N's = 230

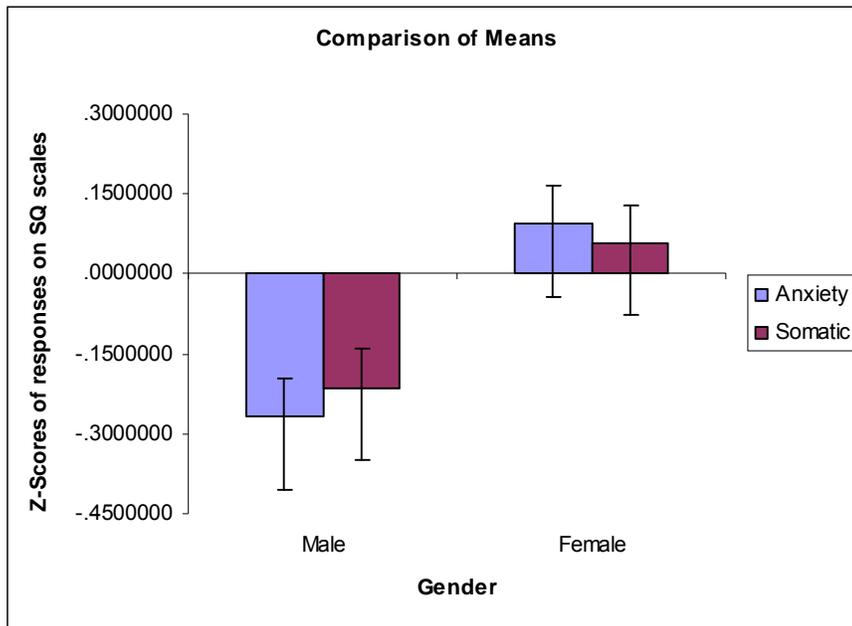
\*\*p < 0.01.

Table 10

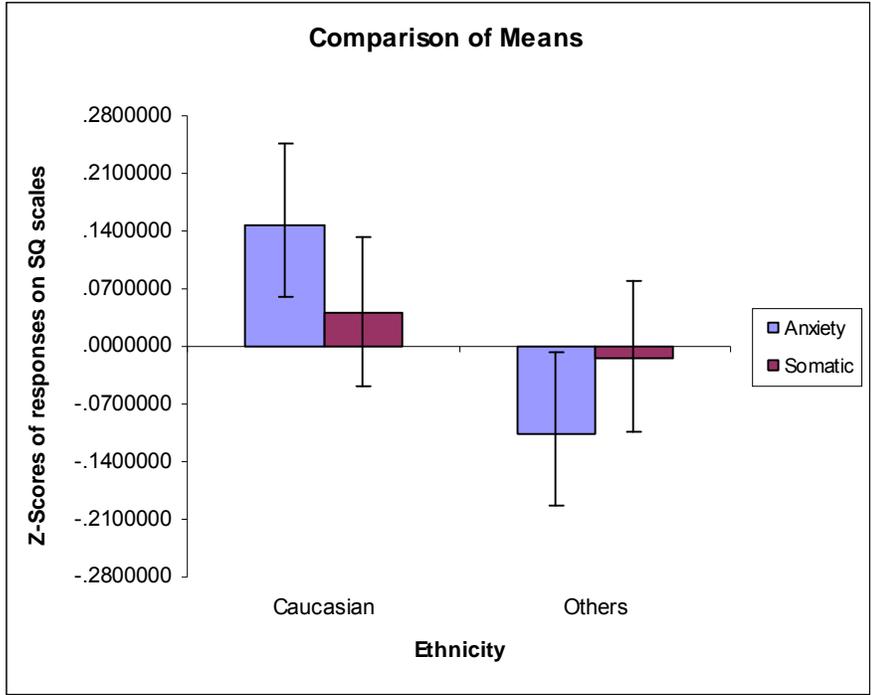
Table for predicting somatic and anxiety scores using socio-affective vigilance, gender and Caucasian

Predictor	Somatic			Anxiety		
	$\beta$	$\Delta R^2$	$\Delta F$	$\beta$	$\Delta R^2$	$\Delta F$
Socio-affective vigilance	0.291**	.085	21.04**	0.484**	.235	69.87**
Low threshold	0.243**	.059	15.59**	0.121*	.015	4.43*
Residuals	0.140	.020	2.70	0.067	.032	4.99**
Caucasian	-0.05	.000	0.01	0.70	.005	1.485
Socio-affective vigilance x Caucasian	-0.556**	.033	8.98**	0.092	.003	0.914
Sex	-0.078	.007	1.61	-0.075	.005	1.716
Socio-affective vigilance x Sex	-0.053	.001	0.63	-0.032	.001	0.274

\*p<.05, \*\*p<.01

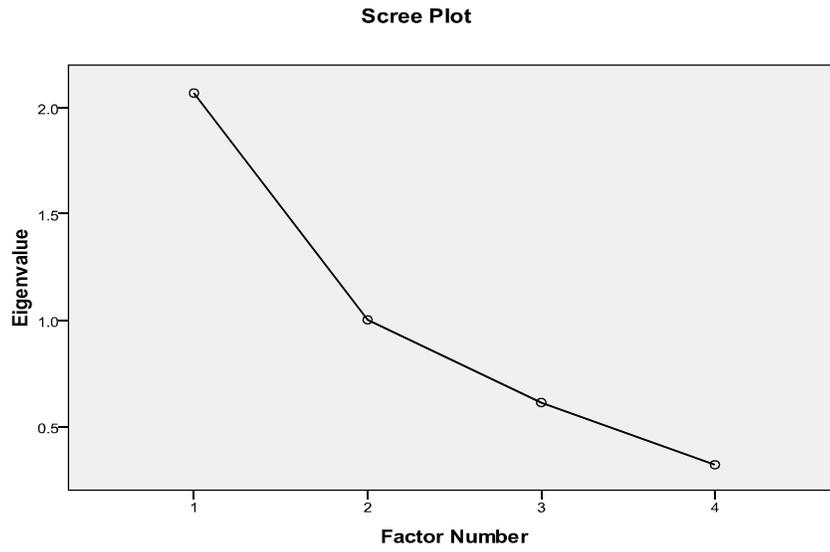


*Figure 2*  
Figure showing comparison of means on Somatic and Anxiety scales from the SQ by gender.



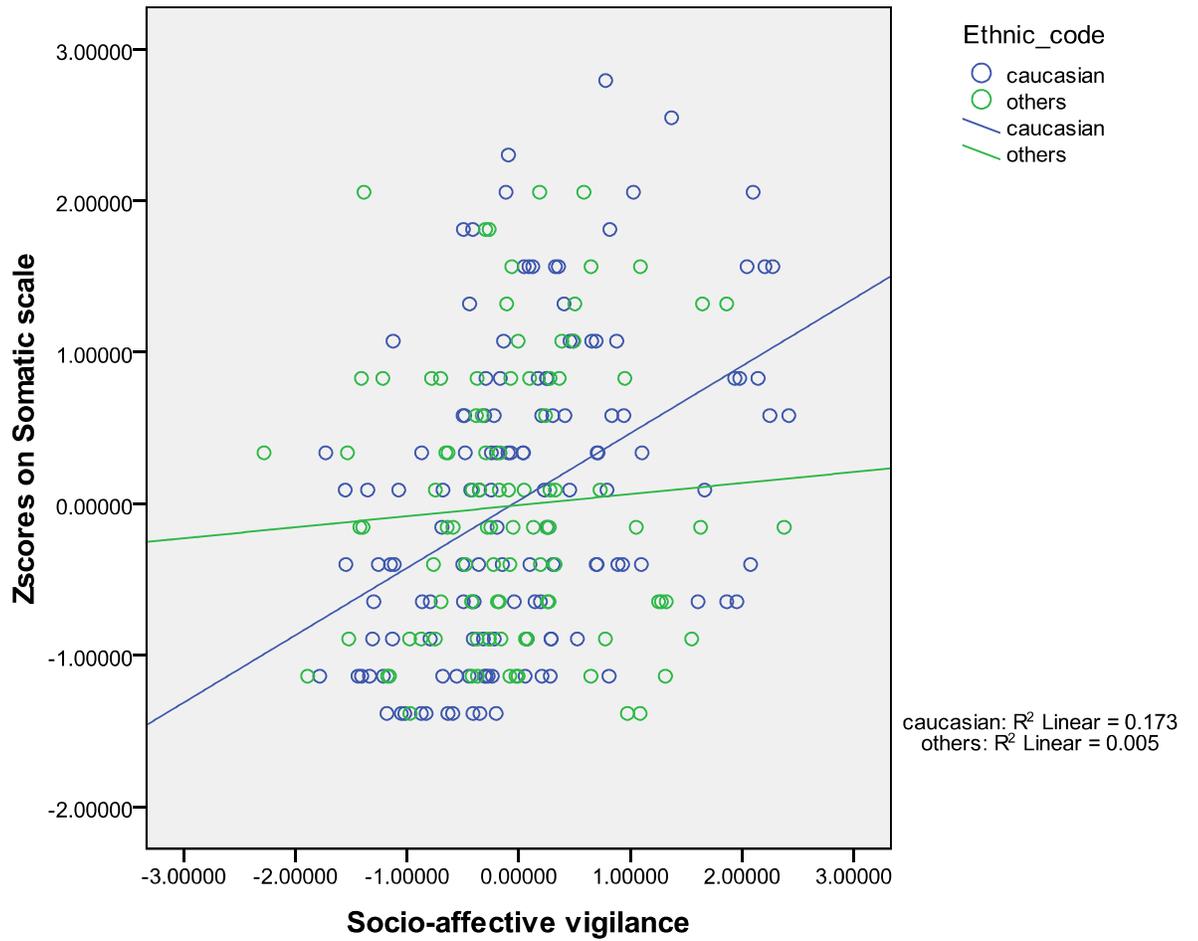
*Figure 3*

Figure showing comparison of means on Somatic and Anxiety scales from the SQ by ethnicity.



*Figure 4*

Figure showing the scree plot generated through exploratory factor analysis



*Figure 5*

Figure showing the interaction effect between socio-affective vigilance and Caucasian in predicting somatic scores from the SQ.

## APPENDIX

Table 3  
Table showing items on the Somatic scale

Feeling of not enough air
Heavy arms or legs
Appetite poor
Tight head or neck
Choking feeling
Feeling of pressure in head or body
Weak arms or legs
Breathing difficult
Parts of the body feel numb or tingling
Heart beating fast or pounding
Pressure on head
Nauseated, sick to stomach
Upset bowels or stomach
Muscle pains
Headaches
Cramps
Head pains

Table 4  
Table showing items on the Anxiety scale

Nervous
Tense, tensed up
Frightened
Shaky
Restless
Afraid
Scared
Worried
Terrified
Takes a long time to fall sleep
Jumpy
Highly strung
Cannot relax
Panicky
Frightening thoughts
Feeling that something bad will happen
Wound up, uptight

Table 5  
Table showing items that made up the factor: Neuroticism

AMBI1	<i>Do you tend to become vigilant and wary of your surroundings?</i>
AMBI8	<i>Do you tend to feel physically anxious (e.g. racing pulse, sweaty)?</i>
AMBI2	<i>Do you feel awkward when you are approached by someone new?</i>
RMBI6	<i>When unfamiliar visitors came to your home, did you feel fearful/nervy?</i>
RMBI16	<i>When you went on outings with your family to new places, would you become quiet or "freeze up"?</i>
SAS1	I worry about doing something new in front of others.
SAS3	I worry about being teased.
SAS4	I feel shy around people I don't know.
SAS8	I worry about what others think of me.
SAS10	I get nervous when I talk to peers I don't know very well.
SAS13	I get nervous when I meet new people.
SAS18	If I get into an argument, I worry that the other person will not like me.
SAS20	I feel nervous when I'm around certain people.
ATQ1	I become easily frightened.
ATQ17	I find it very annoying when a store does not stock an item that I wish to buy.
ATQ25	Sometimes minor events cause me to feel intense sadness.
ATQ51	Sometimes, I feel a sense of panic or terror for no apparent reason.
ATQ58(R)	<i>I usually remain calm without getting frustrated when things are not going smoothly for me.</i>
ATQ68(R)	<i>It does not frighten me if I think that I am alone and suddenly discover someone close by.</i>

*Italics* indicate that scores on these items were reverse coded for analysis.

Table 6

Table showing items that made up the factor: Social Avoidance

AMBI4(R)	Do you tend to approach people whom you don't know and talk to them?
AMBI10	<i>Do you tend to keep a fair distance away from strangers?</i>
AMBI11	<i>Do you tend to withdraw and retreat from those around you?</i>
RMBI1	<i>When unfamiliar visitors came to your home, would you hide or leave the room?</i>
RMBI2	<i>At school, did you tend to stand back and watch other children play?</i>
RMBI9	<i>At school, did you find it difficult to approach and play with new children?</i>
RMBI11(R)	Did you want to be surrounded by people and activity?
RMBI18	<i>When unfamiliar visitors came to your home, would you cling to your mother or father?</i>
SAS15	I'm quiet when I'm with a group of people.
ATQ46	I rarely enjoy socializing with large groups of people.
ATQ72	When I am afraid of how a situation might turn out, I usually avoid dealing with it.

*Italics* indicate that scores on these items were reverse coded for analysis.

Table 7

Table showing items that made up the factor: Thought Distortion

SAS6	I feel that peers talk about me behind my back.
SAS12	I worry about what others say about me.
SAS14	I worry that others don't like me.
SAS17	I feel that others make fun of me.
SAS19	I'm afraid to invite others to do things with me because they might say no.
ATQ20(R)	I seldom become sad when I watch a sad movie.
ATQ41	Sometimes my mind is full of a diverse array of loosely connected thoughts and images.
ATQ57	I am often aware how the color and lighting of a room affects my mood.
WBSI1	There are things I prefer not to think about.
WBSI3	I have thoughts that I cannot stop.
WBSI5	My thoughts frequently return to one idea.
WBSI9	There are thoughts that keep jumping into my head.
WBSI10	There are things that I try not to think about.
WBSI12	I often do things to distract myself from my thoughts.
WBSI13	I have thoughts that I try to avoid.
WBSI14	There are many thoughts that I have that I don't tell anyone.
WBSI15	Sometimes I stay busy just to keep thoughts from intruding on my mind.

*Italics* indicate that scores on these items were reverse coded for analysis.

Table 8

Table showing items that made up the factor: Low Threshold

ATQ7	I would not enjoy the sensation of listening to loud music with a laser light show.
ATQ13	When I am listening to music, I am usually aware of subtle emotional tones.
ATQ18	I tend to notice emotional aspects of paintings and pictures.
ATQ21	I'm often aware of the sounds of birds in my vicinity.
ATQ33(R)	I rarely notice the color of people's eyes.
ATQ36	I find certain scratchy sounds very irritating.
ATQ52	I often notice mild odors and fragrances.
ATQ66(R)	When I watch a movie, I usually don't notice how the setting is used to convey the mood of the characters.
ATQ69	I am often consciously aware of how the weather seems to affect my mood.

*Italics* indicate that scores on these items were reverse coded for analysis.

## REFERENCES

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- Beck, J.E. (2008). A developmental perspective on functional somatic symptoms. *Journal of Pediatric Psychology, 33*(5), 547-562.
- Beesdo, K., Bittner, A., Pine, D.S., Stein, M.B., Hofler, M., Lieb, R., & Wittchen, H. (2007). Incidence of social anxiety disorder and the consistent risk for secondary depression in the first three decades of life. *Archives of General Psychiatry, 64*(8), 903-912.
- Bowlby, J. (1977). The making and breaking of affectional bonds. *British Journal of Psychiatry, 130*, 201-210.
- Burgess, K.B., & Younger, A.J. (2006). Self-schemas, anxiety, somatic and depressive symptoms in socially withdrawn children and adolescents. *Journal of Research in Childhood Education, 20*(3), 175-187.
- Carver, C.S., & White, T.L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67*(2), 319-333.
- Chronis-Tuscano, A., Degnan, K. A., Pine, D., Pérez-Edgar, K., Henderson, H. A., Diaz, Y., Raggi, V. L., Fox, N. A. (in press). Stable, early behavioral inhibition predicts the development of social anxiety disorders in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*.
- Clark, L.A., Watson, D., & Mineka, S. (1994). Temperament, personality, and the mood and anxiety disorders. *Journal of Abnormal Psychology, 103*(1), 103-116.
- Cloninger, C. R. (1986). A unified biosocial theory of personality and its role in the development of anxiety states. *Psychiatric Developments, 3*, 167-226.
- Compas, B.E., Hinden, B.R., & Gerhardt, C.A. (1995). Adolescent Development: Pathways and Processes of Risk and Resilience. *Annual Review of Psychology, 46*, 265-293.

- Costa, P.T., & Mc Crae, R.R. (1987). Neuroticism, Somatic Complaints, and Disease: Is the Bark Worse than the Bite? *Journal of Personality*, *55*, 299-316.
- Davila, J., & Beck, J.G. (2002). Is social anxiety associated with impairment in close relationships? A preliminary investigation. *Behavior Therapy*, *33*, 427-466.
- De Gucht V., Fischler, B., & Heiser, W. (2004). Neuroticism, alexithymia, negative affect, and positive affect as determinants of medically unexplained symptoms. *Personality and Individual Differences*, *36*, 1655-1667.
- Eriksen, H.R., & Ursin, H. (2002). Subjective health complaints, sensitization, and sustained cognitive activation (stress). *Journal of Psychosomatic Research*, *56*(4), 445-448.
- Essau, C.A., Conradt, J., & Petermann, F. (1999). Frequency and comorbidity of social phobia and social fears in adolescents. *Behavior Research and Therapy*, *37*(9), 831-843.
- Evans, D.E., & Rothbart, M.K. (2007). Developing a model for adult temperament. *Journal of Research in Personality*, *41*(4), 868-888.
- Feingold, A. (1994). Gender differences in personality: a meta-analysis. *Psychological Bulletin*, *116*(3), 429-456.
- Field, T. (1996). Attachment and separation in young children. *Annual Review of Psychology*, *47*, 541-561.
- Freud, A. (1962). Assessment of Childhood Disturbances. *Psychoanalytic Study of the Child*, *17*, 149-158.
- Gladstone, G., Parker, G., 2005. Measuring a behaviorally inhibited temperament style: development and initial validation of new self-report measures. *Psychiatry Research*, *135*, 133-143.
- Gross, J.J., & Levenson, R.W. (1997) Hiding feelings: The acute effects of inhibiting negative and positive emotion. *Journal of Abnormal Psychology*, *106*, 95-103.
- Gucht, V.D., & Fischler, B. (2002). Somatization: A critical review of conceptual and methodological issues. *Psychosomatics*, *43*(1), 1-9.
- Hansell, S. & Mechanic, D. (1986). The socialization of introspection and illness behavior. In *Illness Behavior* (ed. S. McHugh and T. M. Vallis), pp. 253-260. Plenum Press: New York.
- Haugland, S., Wold, B., Stevenson, J., Aaroe, L.E. & Woynarowska, B. (2001). Subjective health complaints in adolescence. *European Journal of Public Health*, *11*(1), 4-10.

- Hetland, J., Torsheim, T., & Aaro, L.E. (2002). Subjective health complaints in adolescence: dimensional structure and variation across gender and age. *Scandinavian Journal of Public Health, 30*, 223-230.
- Jiang, N., Sako, T., Hara, T., Takedomi, Y., Ozaki, I., & Yamada, S. (2003). Correlations between trait anxiety, personality and fatigue: study based on the Temperament and Character Inventory. *Journal of Psychosomatic Research, 55*, 493-500.
- Karvonen, J.T., Veijola, J., Kantojarvi, L., Miettunen, J., Ekelund, J., Lichtermann, D., Laksy, K., & Joukamaa, M. (2006). Temperament profiles and somatization - An epidemiological study of young adult people. *Journal of Psychosomatic Research, 61* (6), 841-846.
- Kellner, R. (1987). A symptom questionnaire. *Journal of Clinical Psychiatry, 48*(7), 268-274.
- Kirmayer, L.J., & Robbins, J.M. (1991). Three forms of somatization in primary care: prevalence, co-occurrence and sociodemographic characteristics. *Journal of Nervous and Mental Disease, 179*, 647-655.
- Kirmayer, L.J., & Robbins, J.M. (1996). Patients who somatize in primary care: A longitudinal study of cognitive and social characteristics. *Psychological Medicine, 26*(5), 937-952.
- Kirmayer, L.J., Robbins, J.M., & Paris, J. (1994). Somatoform Disorders: Personality and the social matrix of somatic distress. *Journal of Abnormal Psychology, 103*(1), 125-136.
- Kirmayer, L.J., Groleau, D., Looper, K.J., & Dao, M.D. (2004). Explaining medically unexplained symptoms. *Canadian Journal of Psychiatry, 49*(10), 663-672.
- Koss, J.D. (1990). Somatization and somatic complaint syndromes among Hispanics: Overview and ethnopsychological perspectives. *Transcultural Psychiatric Research Review, 27*, 5-29.
- La Greca, A. M., & Lopez, N. (1998). Social anxiety among adolescents: Linkages with peer relations and friendships. *Journal of Clinical Child Psychology, 26*, 83-94.
- Laugesen, N., Dugas, M.J., & Bukowski, W.M. (2003). Understanding Adolescent Worry: The application of a cognitive model. *Journal of Abnormal Child Psychology, 31*(1), 55-64.
- Littleton, H., Horsley, S., John, S., & Nelson, D.V. (2007). Trauma coping strategies and psychological distress: A meta-analysis. *Journal of Trauma and Stress, 20*(6), 977-988.

- McCrae, R.R., & Costa, P.T., Jr. (1994). The stability of personality: Observations and evaluations. *Current Directions in Psychological Science*, 3, 173-175.
- McDermott, J.M., Perez-Edgar, K., Henderson, H.A., Chronis-Tuscano, A., Pine, D.S., & Fox, N.A. (in press). A History of childhood behavioral inhibition and enhanced response monitoring in adolescence are linked to clinical anxiety. *Biological Psychiatry*.
- Melman, S. (2002). The relationship between levels of participation in regularly scheduled activities in adolescence and anxiety and somatization. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 62(10-B), 4795
- Moitra, E., Herbert, J.D., & Forman, E.M. (2008). Behavioral avoidance mediates the relationship between anxiety and depressive symptoms among social anxiety disorder patients. *Journal of Anxiety Disorders*, 22, 1205-1213.
- Mumford, D.B. (1989). Somatic sensations and psychological distress among students in Britain and Pakistan. *Medicine*, 24(6), 321-326.
- Muris, P., Merckelbach, H., & Horselenberg, R. (1996). Individual differences in thought suppression: The White Bear Suppression Inventory: Factor structure, reliability, validity and correlates. *Behavior, Research and Therapy*, 38, 537-558.
- Muris, P., Vlaeyen, J., & Meesters, C. (2001). The relationship between anxiety sensitivity and fear of pain in healthy adolescents. *Behaviour Research and Therapy*, 39(11), 1357-1368.
- Neeleman, J., Bijl, R., & Ormel, J. (2004). Neuroticism, a central link between somatic and psychiatric morbidity: path analysis of prospective data. *Psychological Medicine*, 34, 521-531.
- Nelson, L.J., Padilla-Walker, L.M., Badger, S., Barry, C.M., Carroll, J.S., & Madsen, S.D. (2007). Associations Between Shyness and Internalizing Behaviors, Externalizing Behaviors, and Relationships during Emerging Adulthood. *Journal of Youth and Adolescence*, 37(5), 605-615.
- Noyes, R., Langbehn, D.R., Happel, R.L., Stout, L.R., Muller, B.A., & Longley, S.L. (2001). Personality dysfunction among somatizing patients. *Psychosomatics*, 42(4), 320-329.
- Parsons, C.D.F., & Wakeley, P. (1991). Idioms of distress: Somatic responses to distress in everyday life. *Culture, Medicine and Psychiatry*, 15(1), 111-132.
- Pennebaker, J.W. & Watson, D. (1991). The Psychology of Somatic Symptoms. In: Kirmayer, L.J. & Robbins, J.M. (Ed.). *Current concepts of somatization: Research and clinical perspectives* (pp. 21-35). London, UK: American Psychiatric Press.

- Pennebaker, J.W., & Beall, S.K. (1986). Confronting a Traumatic Event: Toward an understanding of inhibition and disease. *Journal of Abnormal Psychology, 95*(3), 274-281.
- Piccinelli, M., & Simon, G. (1997). Gender and cross-cultural differences in somatic symptoms associated with emotional distress: an international study in primary care. *Psychological Medicine, 27*, 433-444.
- Purdon, C. (1999). Thought suppression and psychopathology. *Behavior Research and Therapy, 37*(11), 1029-1054.
- Robbins, J.M. & Kirmayer, L.J. (1991). Cognitive and social factors in somatization. In: Kirmayer, L.J. & Robbins, J.M. (Eds.). *Current Concepts in Somatization – Research and clinical perspectives* (pp. 107-141). London, UK: American Psychiatric Press.
- Rothbart, M.K., Ahadi, S.A. & Evans, D.E. (2000). Temperament and personality: origins and outcomes. *Journal of Personality and Social Psychology, 78*(1), 122-135.
- Saint Arnault, D., & Kim, O. (2008). Is there an Asian idiom of distress? Somatic symptoms in female Japanese and Korean students. *Archives of Psychiatric Nursing, 22*(1), 27–38.
- Saint Arnault, D., Sakamoto, S., & Moriwaki, A. (2006). Somatic and depressive symptoms in female Japanese and American students: A preliminary Investigation. *Transcultural Psychiatry, 43*(2), 275–286.
- Steinberg, L., & Morris, A.S. (2001). Adolescent Development. *Annual Review of Psychology, 53*, 82-110.
- Stone, A.A., & Shiffman, S. (2002). Capturing momentary, self-report data: A proposal for reporting guidelines. *Annals of Behavioral Medicine, 24*(3), 236-243.
- Stuart, S., & Noyes, R. (1999). Attachment and interpersonal communication in somatization. *Psychosomatics, 40*(1), 34-43.
- Terre, L., & Ghiselli, W. (1997). A developmental perspective on family risk factors in somatization. *Journal of Psychosomatic Research, 42*(2), 197-208.
- Thomas, A., & Chess, S. (1977). *Temperament and development*. New York: Brunner/Mazel.
- Tull, M.T., Gratz, K.L., Salters, K., & Roemer, L. (2004). The role of experiential avoidance in posttraumatic stress symptoms and symptoms of depression, anxiety, and somatization. *The Journal of Nervous and Mental Disease, 192*(11), 754-761.

- Turk, D.C. (1999). The role of psychological factors in chronic pain. *Acta Anaesthesiologica Scandinavica*, 43, 885-888.
- Turk, C.L., Heimberg, R.G., Luttrek, J.A., Mennin, D.S., & Fresco, D.M. (2005). Emotion dysregulation in generalized anxiety disorder: A comparison with social anxiety disorder. *Cognitive Therapy and Research*, 29(1), 89-106.
- Vassend, O., & Skrondal, A. (1999). The role of negative affectivity in self-assessment of health: A structural equation approach. *Journal of Health Psychology*, 4(4), 465-482.
- Viner, R., & Christie, D. (2005). Fatigue and somatic symptoms. *British Medical Journal*, 330, 1012-1015.
- Watson, D., & Clark, L.A. (1992). On traits and temperament: General and specific factors of emotional experience and their relation to five-factor model. *Journal of Personality*, 60(2), 441-476.
- Wegner, D.M., & Zanakos, S. (1994). Chronic thought suppression. *Journal of Personality*, 62, 615-640.
- Wessely, S., & White, P.D. (2004). There is only one functional somatic syndrome. *British Journal of Psychiatry*, 185, 95-96.

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