ALEXITHYMIA AND THE CAPACITY TO EVALUATE STATES
OF AFFECT AND PAIN

by

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Abstract

Alexithymia is conceptualized as a personality variable involving profound affective deficits. Individuals with high levels of alexithymia are characterized by difficulty in describing emotions, a preoccupation with somatic symptoms, and an insensitive interpersonal style. Alexithymia is commonly found among chronic pain patients. Despite a burgeoning literature, researchers have not identified either the precise characteristics and source of the poor interpersonal performance associated with alexithymia, or how the presence of alexithymia relates to the phenomenology and conceptualization of pain.

The Toronto Alexithymia Scale (TAS-20) was used to assess alexithymia in a sample of 145 female university students who had reported experiencing significant pain during the past year. An exploratory factor analysis was conducted to check the factor structure of the TAS-20 with this sample. A series of three studies was designed to explore the relationship with alexithymia and: 1) reactions to facial expressions of emotion, 2) reactions to others' pain, and 3) conceptualization of own pain.

The cleanest factor solution was yielded by a Maximum Likelihood Analysis with oblique rotation. In this sample, the TAS-20 is adequately represented as 4 factors: 1) Difficulty Identifying Bodily Sensations (Body); 2) Confusion about Emotions (Emotions); 3) External Cognitive Style (External), and 4) Interpersonal Awkwardness (Awkward).

Study 1 investigated the ability to judge and respond to facial expressions of emotion, as a potential source of interpersonal difficulties. Participants examined slides of adults modeling specific emotions, and attempted to identify the modeled affective states.
Alexithymia was expected to be related to difficulty in assessing facial expressions of emotion. As predicted, the ability to identify and appropriately respond to modeled emotional expressions was significantly lower in high-alexithymia participants. Alexithymia scores were related to a tendency to rate various modeled emotions as "pain," providing support for the association with a somatic preoccupation.

Study 2 entailed evaluation of interpersonal perception in the context of pain by investigating the relationship between alexithymia and judgement of pain in infants. Participants evaluated two dimensions of pain (sensory discomfort and emotional distress) while watching videotapes of neonates undergoing invasive but routine medical procedures. It was hypothesized that the somatic preoccupation and emotional insensitivity associated with alexithymia would lead high-alexithymia individuals to exaggerate the sensory component of pain in infants and underestimate the affective domain. Predictions were only partially supported. When depressed mood and extent of current pain were controlled, the hypothesized relationship emerged between the TAS-20 External factor and lower ratings of perceived emotional distress, and between the Body factor and higher ratings of perceived sensory discomfort. Contrary to expectations, Body factor scores were related to higher emotional distress ratings.

In Study 3, participants assessed retroactively the sensory and affective components of their own painful experiences. There is an increasing trend for multidisciplinary pain clinics to include psychological interventions, treatments whose success is largely dependent upon patients distinguishing the sensory and affective components of pain. It was predicted
that high-alexithymia participants would emphasize the sensory rather than the affective dimension, a judgement pattern which could explain the link found between high levels of alexithymia and poorer recovery from chronic pain conditions. Contrary to expectations, it was found that alexithymia scores were unrelated to ratings of sensory intensity. After controlling for depressed mood and extent of current pain, the only significant result to emerge was between the TAS-20 Awkward factor and higher (not lower) ratings of the affective component of participants’ own painful experiences.

Results suggest that a source of the social awkwardness associated with alexithymia may arise from an insensitivity to facially expressed mood states. There is some evidence that individuals with an external cognitive style pay less attention to the affective distress entailed in infants’ pain experiences. The overall pattern of results suggests that alexithymia, as measured by the TAS-20, is best viewed as factorially complex. While the factors display some interdependence, there is greater utility in computing and examining all factor scores rather than describing individuals by a global TAS-20 total score.
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Alexithymia and the Capacity to Evaluate States of Affect and Pain

Introduction

The alexithymia construct is represented by a cluster of core characteristics, notably an impaired capacity to recognize, describe, and differentiate emotions. Believed to affect between two and ten percent of the general population (Linden, Wen, & Paulhus, 1994), the concept of alexithymia was introduced in the early 1970’s as a personality feature dominated by inadequacy in experiencing and expressing emotions (Apfel & Sifneos, 1979; Taylor, 1984). Measures of alexithymia vary widely. The construct has been assessed by subscale scores of personality inventories (MMPI; MMPI-A), semi-standardized interview schedules (e.g., the Beth-Israel Questionnaire; Sifneos, 1973), self-report questionnaires (e.g., the Schalling-Sifneos Personality Scale; Sifneos, 1986, the Toronto Alexithymia Scale; Taylor, Ryan, & Bagby, 1985), as well as by a variety of projective tests and speech analyses. The Toronto Alexithymia Scale (TAS) appears to be the most psychometrically sound measure (Hendryx, Haviland, Gibbons, & Clark, 1992; Linden et al., 1994), with its latest revision, the TAS-20, introduced in 1992 (Bagby, Taylor, & Parker).

While reduced abilities to recognize, describe, and label emotions are considered fundamental to alexithymia, a broad variety of additional features have been noted, including a tendency to express emotional distress in terms of physical complaints (Kauhanen, Kaplan, Cohen, Salonen, & Salonen, 1994; Wise & Mann, 1993), lack of empathy (Krystal, 1979), poor interpersonal functioning (Apfel & Sifneos, 1979; Lesser & Lesser, 1983; Thome, 1990), and paucity of imagination (Taylor & Bagby, 1988). Clinically, individuals with high levels of alexithymia appear blunted or flat, often display a
preoccupation with details of external events, and have been described as interpersonally boring (Gage & Egan, 1984). Despite a rapidly growing literature, some investigators feel that the construct has not yet been adequately validated (McDonald & Prkachin, 1990).

Reasons for the reduced social skills seemingly inherent in alexithymia are not fully understood. It has been posited that disorders which make it harder for individuals to recognize their own emotions would also limit their ability to communicate effectively with others (Buck, 1980), but research refining the specific interpersonal deficiencies associated with alexithymia has been sparse, and little is known precisely about the nature and extent of these deficits.

One way to understand social impairment is to examine the processes involved in interpersonal interaction that may affect social performance. Thus, clues to the source of social ineptitude might be found by delineating some of the salient stimuli of the interpersonal environment and identifying to what extent individuals with alexithymia experience difficulty in identifying and appreciating the significance of these stimuli.

Facial expression is considered by some to be one of the most important sources of information about another individual's emotional state (Collier, 1985; Ekman & Friesen, 1971), and serves a vital social-communicative function (Izard, 1990). Recognition of facial emotion is a prime ingredient in social perception, and profoundly important in interpersonal functioning. The ability to perceive accurately the feelings of another person is also considered a most fundamental aspect of empathy, since without accurate perception of another's emotions, it would be impossible to feel what others feel or to respond with compassion (Levenson & Ruef, 1992). People assume that their visually communicated
emotional and conversational signals will be interpersonally effective (Ekman, 1994), and indeed most people are fairly accurate in identifying emotions from facial expressions (Ambady & Rosenthal, 1992; Ekman & Friesen, 1971). Evidence from social psychology suggests that people who respond correctly to facially expressed emotional cues are perceived as likable (Mehrabian, 1972), and impaired judgement in this area severely disrupts social perception and interaction (Shaver, 1981).

Individuals with high levels of alexithymia, because of their low affective discriminative ability, might be expected to show insensitivity to facially expressed subjective states, leading to inappropriate response styles and poor empathic ability, and thus severely limiting their interpersonal effectiveness. While several clinical reports suggest that alexithymia is linked to abnormalities in facial communication (Nemiah, 1978; Taylor, 1984; 1987), judgement of, and response to, others’ nonverbal expression has received less attention.

In contrast to diminished awareness of affective cues, alexithymia also has been associated with an over-awareness of sensory symptoms. Researchers report a relationship between alexithymia and an increased tendency to report somatic disorders (Flannery, 1977; Taylor, Parker, Bagby, & Acklin, 1992). Alexithymia has been linked with exaggerated illness behaviour and symptom awareness (Kauhanen et al., 1994), and many investigations show an increased incidence of alexithymia in patients with physical symptoms. Sometimes these are symptoms considered to be idiopathic in nature (Kirmayer, Robbins, & Paris, 1994; Wise & Mann, 1993), but most often they represent general bodily signs and symptoms rather than classic “psychosomatic” dysfunctions (Cohen, Auld, & Brooker,
1994). The tendency to overemphasize physical complaints rather than emotional symptoms has generated considerable interest among alexithymia researchers, and various theories have been proposed to explain this tendency, but as yet no fully integrated theory has received general acceptance.

Extremely robust is the finding of a high prevalence of alexithymia in chronic pain patients (Acklin & Alexander, 1988; Cox, Kuch, Parker, Shulman, & Evans, 1994; Kinder & Curtiss, 1990; Papciak, Feuerstein, Belar, & Pistone, 1986). Chronic pain patients with high levels of alexithymia have been reported to remain in treatment longer than low-alexithymia control groups (Wise & Mann, 1993), to use more words to describe their pain condition (Cox et al., 1994), and to have a significantly longer duration of pain (Kinder & Curtiss, 1990). While there is a large body of research material showing that alexithymia is relatively common in those reporting persistent pain, much of this material has not examined the various components of pain, but has conceptualized it as a unitary construct. Pain is not unidimensional, however, and is now generally recognized as having at least three conceptually distinct components: sensory, affective, and cognitive/evaluative (Melzack, 1973; Melzack & Wall, 1988), although many researchers conceptualize pain as containing just the first two of those dimensions (e.g. Cassell, 1982). It may be possible to better understand the link between alexithymia and pain by looking at the separate dimensions of the pain construct, the social variables affecting early pain experiences, and the nonverbal communication of pain.

The present series of studies aimed to explore the finer judgement of individuals with high levels of alexithymia in the areas of facially expressed emotion and pain. When
exposed to written expressions of emotion, one study found female inmates with high TAS scores to be poor reporters of affect in others (Louth, Hare, & Linden, in press). Of interest here is whether this impaired ability to appreciate the emotional lives of others in the verbal domain, as demonstrated in the above study, is also reflected in decreased sensitivity to nonverbal communication. Insensitivity to facially expressed emotions can be considered a communication deficit, and demonstrating an inverse relationship between alexithymia and skill in this area would shed some light on the poor interpersonal performance shown by individuals with high levels of alexithymia. The results of Study 1 were expected to show that such persons would be inaccurate judges of modeled emotional states, and that their reported responses would be incongruent with the modeled emotions.

Insensitivity to facial expressions of pain can also inhibit communication. Pain expressions are social behaviours that serve several functions, including soliciting aid, warning of danger, eliciting sympathy, and forming interpersonal ties (Prkachin & Craig, 1995). Since alexithymia is associated with affective insensitivity coupled with somatic preoccupation, individuals with high levels of this personality trait may neglect the presence of affective distress when judging pain expression in others. In other words, alexithymia may be associated with a differentially impaired ability to assess facially expressed pain -- a pattern of exaggerating the sensory component of pain while neglecting the emotional aspect.

Obtaining appropriate stimuli to depict actual pain, as opposed to analogue stimuli, poses a challenge. For Study 2, existing videotapes were available of infants undergoing a heel-lance procedure. These infants had been filmed for a previous study of facial
expressions of pain. Advantages of utilizing neonates include the fact that they show a very characteristic facial reaction to pain (Grunau & Craig, 1987), and also raters are unlikely to conclude dissimulation in infants.

Impaired ability to interpret facial expressions of pain in infants has important implications for the process of communication between infants and caregivers, and also for the personality development of the growing child. There is experimental evidence that children are affected by caregivers’ attitudes towards pain (Pilowsky, 1986), and the influence of early experiences can be lifelong (Melzack & Wall, 1988). If an infant is exposed to a caregiver who is insensitive to the emotional distress involved in pain but conceptualizes the pain experience solely as a physical sensation, this same tendency might be transmitted and endure in the developing infant, leading to the development of an alexithymic style.

While there are undoubtedly many different mechanisms by which people acquire alexithymic traits, the caregiver/infant relationship may be one of the developmental pathways to the acquisition, development, and maintenance of alexithymic characteristics. Attachment studies show that the personality and affective characteristics of the primary caregiver play an important role in the formation of the child’s personality (Bowlby, 1988; Rothbard & Shaver, 1994). It was anticipated that individuals with high levels of alexithymia, when rating affective and sensory dimensions of neonate pain, would tend to ignore infants’ emotional discomfort, and yet estimate the physical intensity of their pain as higher than those with low alexithymia scores.
The aim of Study 3 was to explore the influence of alexithymia on participants' conceptualizations of their own pain by asking them to rate, retrospectively, a memorable painful event in terms of affective and sensory experience. Memory for pain is generally considered trustworthy (Smith, Salovey, Turk, Jobe, & Willis, 1993), though it has been found to be distorted by amount of current pain and time elapsed since the painful event (Eich, Rachman, & Lopatka, 1990; Erskine, Morley, & Pearce, 1990). It was expected that alexithymia would be negatively associated with ratings of emotional distress, yet positively correlated with ratings of sensory intensity. There is a high prevalence of alexithymia in clinical settings, and if the presence of alexithymia is associated with a bias towards underestimating, or even ignoring, the affectivity of pain, management of such individuals may be compromised.

Before embarking upon the current studies, it was decided to conduct an exploratory factor analysis of TAS-20 scores in order to determine whether previously found factors would emerge in this sample. Some researchers have recommended checking the factor structure of this most recent version of the TAS with each new sample (e.g., Haviland & Reise, 1996).

A refined understanding of the nature of alexithymia would be important in several fields. It was hoped that the current studies would help to clarify the interpersonal dysfunction associated with alexithymia, suggest a possible developmental pathway to the acquisition of alexithymic characteristics, and highlight the treatment conundrum of managing pain patients who display attributes of alexithymia. It was also hoped to provide further support for the alexithymia construct, by demonstrating that alexithymia is related to
theoretically consistent variables, and to confirm the factor structure of the most widely used measure of alexithymia — the TAS-20 — in a non-clinical pain population.

**Review of the Literature**

**Alexithymia**

**Conceptualization of Alexithymia**

Alexithymia was derived initially from clinical observations of patients. The term (‘a’ = without; ‘lexi’ = words; ‘thymus’ = feelings) was coined by Sifneos (1972) to designate a specific disturbance in the capacity to recognize, describe and label feelings. Much earlier, Freedman and Sweet (1954) had referred to such people as “emotional illiterates,” and researchers tend to agree that there is a disorder that represents a genuine inability to verbalize emotions rather than denial or repression of feelings (Wise, Mann, Hryvniak, Mitchell, & Hill, 1990). Clearly, alexithymia is a personality variable with some profound deficits. Although the construct has been recognized clinically for some decades and its existence is widely documented, only recently have reliable and valid assessment instruments been available. In many ways alexithymia remains a relatively little-known and poorly understood condition.

Although alexithymia is generally referred to as if it were a taxon, prevailing opinion conceptualizes the construct as a continuous personality variable (Berenbaum & Prince, 1994; Taylor, Bagby, & Parker, 1997). Because alexithymic characteristics can be observed in a wide cross-section of people, Taylor (1994) concludes “alexithymia appears to be a personality trait that is probably normally distributed in the general population” (p.61). Taylor justifies the use of the term “personality trait” by reporting that the concept of
Alexithymia fulfills Costa and McCrae's (1987) requirements that a personality trait must be able to be reliably measured, and that it must relate to measures of established dimensions of personality (Taylor, 1994). Alexithymia has been found to correlate with scores assessing the five-factor model of personality. For example, scores on the most recent Toronto Alexithymia Scale (TAS-20; Bagby et al., 1992) correlate positively with Neuroticism and negatively with Openness to Experience, elements of which include attentiveness to inner feelings, aesthetic sensitivity, and active imagination (Bagby, Parker & Taylor, 1994).

**Theories of Etiology**

Etiology of alexithymia is unknown, but as with most causal theories of maladaptive personality features, the condition is generally presumed to be multidetermined. While theoretical perspectives range from learning, cognitive, and psychodynamic formulations to proposals of biological substrates of alexithymia, papers devoted to uncovering the factors that influence its development have been relatively sparse (Berenbaum & Prince, 1994). Models of the origins of alexithymia have focused on explanations that deal with either transitory conditions (state formulations), or relatively permanent dispositional styles. The etiological formulations that have been proposed can be grouped under two broad headings, both with different assumptions and proposed causes: (a) alexithymia as a stable personality trait (primary alexithymia), and (b) alexithymia as a situation dependent state (secondary alexithymia). At present, there are insufficient longitudinal data to determine whether alexithymia is an enduring trait or if it reflects transitory situational states, or whether -- as is more probable -- it occurs as both formulations.

**Trait alexithymia.**
There are some competing etiological explanations from biological and developmental perspectives. For example, right hemisphere damage has been proposed as a cause of alexithymia. Dewaraja and Sasaki (1990) found data to support a theory of interhemispheric transfer deficits, where affective material (from the right hemisphere) is not adequately conducted to the left hemisphere (linguistic functions). This hypothesis was supported by a study by Hoppe and Bogan (1977), showing that commissurotomized (split brain) patients displayed severe alexithymic characteristics such as inability to describe and differentiate emotions. The right hemisphere is often implicated in biological models of alexithymia because of the assumption that individuals displaying alexithymia have a deficit in affect recognition that is analogous -- but not isomorphic -- with affect recognition deficits associated with right hemisphere dysfunction (Berenbaum & Prince, 1994; Taylor & Bagby, 1988). Demonstrating differences in brain states alone does not support either biological or socialization etiological theories of alexithymia. All behaviour has biological substrates, and differences could be the product of socialization as well as inheritance, trauma, or other conditions.

Developmental explanations have also been proposed, wherein alexithymia is seen to be caused by a disturbance originating in preverbal childhood when children must express any discomfort they feel through their body (Lindberg & Lindberg, 1988). Sivik (1993) theorized that when a primary caregiver consistently fails to supply a verbal language for emotions, this leads to the infant developing primary alexithymic traits, with a low capacity to later verbalize feelings. Similarly, Berenbaum and James (1994) implicate the mother-infant relationship as a source of alexithymia. They posit that some children grow up in
home environments where the expression of emotion is discouraged, and that such children would not learn to cope with their emotional states and would consequently be uncomfortable expressing emotion. In confirmation of this idea, they found the best predictor of alexithymia was having been raised in a home where there was little positive communication.

**State alexithymia.**

Also known as secondary, or reactive alexithymia, this is seen as a temporary condition, a coping response in times of extreme or chronic stress (Gage & Egan, 1984). Incarceration might represent such a situation (Thome, 1990); so might chronic pain (Bach, Bach, Böhmer, & Nutzinger, 1994). Some theorists see alexithymia in dynamic terms, as a defensive reaction of the psyche against the formation of thoughts that are too painful or frightening (e.g., Thome, 1990). Most researchers agree that it is not merely a dissociative defense that is involved (Taylor, Bagby, & Parker, 1993). As Wise et al., (1990) claim, alexithymia is a deficit state not a denial state, or as Keltikangas-Järvinen (1982) asserted, it is not a denial of emotions but true absence of feelings. However, the possibility cannot be excluded. For example, alexithymic attributes may develop as a result of negative reinforcement wherein cessation of the aversive stimulus (formation of painful or frightening emotive thoughts) would act as a reinforcer for adopting an undifferentiated or somatic view of emotions. Regardless of the causal mechanism, potential modifiability is implied in secondary alexithymia (Legorreta, Bull, & Kiely, 1988).

**Interpersonal Sensitivity and Communication**
Alexithymia is usually thought of in terms of impaired ability to perceive one's own internal states, but it is also associated with impaired social perception (Kirmayer & Robbins, 1993; Taylor, 1987). Although researchers describe individuals with alexithymia as exhibiting poor interpersonal skills, currently there is no solid explanation for their compromised social skills.

A previous study found evidence that female prisoners with high alexithymia scores were poor reporters of affect in others. When presented with a written account of a tragic scenario, those with alexithymia displayed striking differences from others in the ability to describe others’ emotions (Louth et al., in press). When participants were asked to describe the feelings of the family of a two year old boy who was taken from his mother and brutally killed, high-alexithymia women performed poorly at this task; they showed little insight, imagination, or empathy.

McDonald and Prkachin (1990), in a pilot study of 20 male undergraduates, concluded that high-alexithymia males did possess a cognitive representation of affective information, but were limited in their interpersonal communication of such information.

**Alexithymia and Somatic Awareness**

Lacking insight into feelings and other inner experiences, individuals with alexithymia may tend to focus on and amplify the physiological component of emotional arousal, leading to confusion and difficulty in naming feelings (Taylor & Bagby, 1988). This tendency to minimize affect and focus on physiology may lead to increased somatization, and even disease (Taylor & Bagby, 1988), providing some foundation for the relationship which researchers have found between alexithymia and hypertension (Gage & Egan, 1984);
alexithymia and rheumatoid arthritis (Lindberg & Lindberg, 1988); alexithymia and the human immunodeficiency virus (Thome, 1990); alexithymia and hypochondriacal concern (Wise et al., 1990) -- in fact alexithymia has been associated with a diverse and extensive range of physical symptoms and bodily concerns (Heiberg, 1980; Taylor et al., 1992). Moreover, significant correlations have been found between alexithymia and increased levels of illness severity and duration (Bach et al., 1994).

Various theories have been proposed to explain the somatic preoccupation associated with alexithymia. Cognitive explanations stress the limited cognitive processing of affect, proposing that this leads to amplification of the somatic sensations of emotional arousal, which are then experienced as overwhelming somatic distress, and/or misinterpreted as signs of disease (Lane & Schwartz, 1987; Taylor et al., 1992). In other words, alexithymia might influence individuals' tendencies to attribute all somatic sensations to physical illness rather than to emotional or interpersonal conflict (Kirmayer et al., 1994). Others have proposed that the inability to express emotions spontaneously leads to high autonomic arousal that compromises the immune system and contributes to disease (Anderson, 1981; Buck, 1976; Pennebaker, 1990; Selye, 1978).

Several investigators have sought an explanation by exploring potential biological substrates of alexithymia. Most of the work in this area has posited subtle abnormalities in the corpus callosum, resulting in a restriction of interhemispheric transfer of information. Affect (presumed to be largely a function of the right hemisphere) could thus become somatized because of its limited access to verbal expression (predominantly a left hemisphere function) (Hoppe & Bogan, 1977). Shipko (1982) describes a similar theory
Alexithymia, Pain, and Affect

linking alexithymia with illness. The theory states that pain signals, if they are unable to be emotionally expressed and visualized via the right hemisphere, are processed mainly by the left hemisphere. Some non-medical means of pain control involve imagery and visualization, and the benefits of such methods would thus be unavailable to those with a disturbance in callosal transfer -- whether pathological or functional. Shipko concludes that alexithymia would therefore be linked to somatization by the prevention of right hemispheric processing of painful stimuli, implicating alexithymia “as a causative factor in psychosomatic illness” (p.83).

It was much more common in the seventies and early eighties for brain lateralization to be discussed in such absolute terms as “right-hemisphere-dependent affective understanding [versus] left-hemisphere-dependent verbalization” (TenHouten, Walter, Hoppe, & Bogen, 1987; p.1). During the last decade, however, this sharp demarcation has been seriously questioned, and theories range from the extreme denigration of hemispheric specialization (Efron, 1990) to a view that emphasizes limitations on hemispheric independence and the plastic and variable degree of specialization (Bogen, 1993).

A better understanding of the link between alexithymia and disease would result from longitudinal studies, but since the overwhelming majority of research has used correlational analyses within a cross-sectional design, it cannot be concluded that alexithymia constitutes an etiological factor in disease (Bach et al., 1994; Taylor et al., 1992). It could be a disposing, maintaining, or resulting factor (Cox et al., 1994; Kauhanen et al., 1994). Despite a lack of prospective evidence, alexithymia is often included as a psychological risk factor in the development of disease in certain subgroups (Cottier, Perini,
& Rauchfleisch, 1987), or as Taylor (1994) has phrased it: “a high level of alexithymia is considered a personality risk factor for a variety of medical and psychiatric disorders” (p.61). Some researchers attribute a stronger causal role to alexithymia than the evidence would suggest. Thome (1990), for example, claims that the presence of alexithymia can precipitate the onset of acquired immune deficiency syndrome (AIDS) in individuals positive for human immunodeficiency virus (HIV), or even that “a type of psychic functioning such as permanent alexithymia may facilitate infection with HIV” (p.42), thereby constituting a risk factor perhaps almost as important as frequency of exposure to the virus.

Efforts to tease out causal factors are complicated by findings that correlations with somatic variables are not uniform in strength across the subscales of alexithymia. Kirmayer & Robbins, for example, studied relationships between TAS factors and several health-related variables (1993). They found that the TAS factor reflecting externally oriented thinking was positively correlated with emotional suppression and negatively correlated with severity of medical history. The factor reflecting difficulty identifying feelings and bodily sensations was significantly related only to body consciousness. Two cross-generational studies found alexithymia was related to family-of-origin functioning (Berenbaum & James, 1994; Lumley, Mader, Gramzow, & Papineau, 1996), but both relied largely on retrospective self-report data.

**Alexithymia and Pain**

There seems to be a strong relationship between alexithymia and chronic pain, with investigators reporting a high prevalence of alexithymia in pain patients (Cox et al., 1994),
some as high as 66% (Sivik, 1992). Assessment and treatment of chronic pain pose challenging difficulties, and management of pain patients with high levels of alexithymia can be especially formidable, for several reasons. If, for example, they have limited ability to understand insightfully that physical complaints are augmented by emotional distress (as Wise & Mann, 1993, suggest), alexithymic patients may be unreceptive to certain psychological interventions. Also, since a constricted verbal repertoire is generally seen as the main characteristic of alexithymia, inability to articulate the full range of pain qualities may represent a considerable management problem (Cox et al., 1994). Such difficulties have prompted some researchers to recommend routine assessment of alexithymia in pain clinics (Kauhanen et al., 1994; Mendelson, 1982).

**Summary**

In summary, alexithymia, though widely reported, remains a controversial condition in need of further study. The social skills of individuals with alexithymia are poor, but specific interpersonal deficiencies are as yet unspecified. They are overrepresented in medical settings, especially pain clinics, yet it is not known precisely how alexithymia is related to dimensions of pain experiences. Etiology of alexithymia remains obscure, with controversy centering on the extent to which it may be considered a trait or a state, and the role of biological versus environmental factors. The possibility of alexithymic characteristics being acquired in childhood via insensitive parenting has been suggested, but is still largely unexplored.

**Pain**

**Dimensions of Pain**
Pain, once thought to be a single, physical entity, was later dichotomized into physiological pain and psychological pain, a Cartesian dualism which (though deeply entrenched in the minds of many) is now considered obsolete (Fordyce, 1986). Melzack and Casey (1968), drawing from many sources, including the gate control theory (Melzack & Wall, 1965), pioneered a three-dimensional view of pain. Though Melzack and Casey recognized the possibility of other important facets of pain, the dimensions they considered to be major are: sensory-discriminative, motivational-affective, and cognitive-evaluative. These components -- particularly the first two -- have been supported by empirical investigations. For example, Jamner and Tursky (1987) report evidence demonstrating the relative independence of the dimensions, especially the distinctiveness of the sensory intensity of pain from its associated emotional features. A number of investigators have demonstrated that pain descriptor scales provide independent measures of these two domains, and that it is possible to initiate changes on one dimension while leaving the other unchanged (e.g., Gracely & Dubner, 1987; Price & Harkins, 1987). Jensen and colleagues developed a scale to provide a brief and psychometrically sound measure of pain affect -- the Pain Discomfort Scale (PDS; Jensen, Karoly, & Harris, 1991). Though they admit some overlap with cognitive aspects of the pain experience, the authors make the point that since a pure measure of affect "would not serve the intended purpose of assessing the affective response associated specifically with pain" (p.153), they consider the PDS to assess "the affect that patients attribute to their pain experience" (p.153).

The independence of sensory and affective components of pain is not without controversy. Fernandez and Turk (1992; 1994), for example, point to the existence of
multicollinearity among factors of pain assessments instruments such as the McGill Pain Questionnaire (MPQ; Melzack, 1975) as evidence for considerable overlap between dimensions. They also question the role of demand characteristics when participants are directed to evaluate different components of painful sensations. The evidence that Fernandez and Turk present, as they acknowledge, does not undermine the actual existence of sensory and affective contributions to pain as much as raise questions about the adequacy and objectivity of current measurement instruments (1992).

The importance of the psychological domain is underlined by the growing number of nonpharmacological treatments for pain management (Keefe, Dunsmore, & Burnett, 1992; Philips, 1987) and the rise of multidisciplinary pain clinics that combine medical, psychological, occupational/vocational, and physiotherapeutic interventions. Pain is a problem that has been shown amenable to cognitive behavioural intervention, and a fundamental tenet of such treatment is a focus on the interplay between different components of the pain experience. Since cognitive behavioural approaches are designed to increase patient control over pain by teaching about its relation to cognitive, affective, behavioural, and physiological variables, communicating to patients about the different components of pain is a vital step in successful application of such therapeutic techniques.

**Socialization of Pain Behaviour**

The evidence that pain is affected by cultural factors suggests that early experiences influence pain behaviour, and this has been demonstrated experimentally. Modeling has been shown to play a role in children’s responses to pain (Craig, 1983), as well as in adult pain behaviour (Craig & Weiss, 1971). Not surprisingly, children are affected by the
attitudes of their parents towards pain. This process has been shown to begin early in life; infants’ relationships with caregivers impact their early pain experiences, and adaptive response to aversive conditions at young ages is considered to depend largely upon effective communication with caregivers (Bush & Harkins, 1991). The interpretation of somatic sensations as pain, rather than as discomfort or emotion, partly reflects a process of observational learning (Bush & Harkins, 1991), as does the evaluation of pain as significant or irrelevant (McGrath, 1990). Children exposed to a family member who responds to pain signals not with emotion but with high levels of illness behaviour would be expected to exhibit high somatization. Children raised in homes where atypical pain behaviours are modeled tend to acquire these atypical patterns themselves (Craig, 1986; Melzack & Wall, 1988; Osborne, Hatcher, & Richtsmeier, 1989; Bush & Harkins, 1991). When compared with a control group, children with pain in the absence of identifiable organic etiology (e.g., recurrent abdominal pain) were found to have more first degree relatives with similar types of disorders (Walker, Garber, & Greene, 1993; 1994). Dunn-Geier and colleagues reported that the children more likely to miss school because of pain were those whose parents encouraged pain expression, and that family reinforcement of well behaviour versus pain behaviour resulted in an increase of the former with a corresponding reduction in the latter (Dunn-Geier, McGrath, Rourke, Latter, & D’Astous, 1986).

Of course, these and similar findings (e.g., Hughes & Zimin, 1978; Routh & Ernst, 1984) might reflect physical vulnerability due to genetic factors, rather than signaling the influence of sociopsychological processes in the development of illness behaviours. It is generally believed, however, that a child’s reactions to pain are shaped by the responses of
its parents during the countless opportunities that exist for observational learning. In a prospective study of preterm infants, the importance of maternal factors in relation to somatization at age 4-1/2 was confirmed by stepwise discriminant analysis. Levels of maternal sensitivity and responsiveness predicted such items as stomach aches, headaches, leg pains, as well as other somatic symptoms and concerns (Grunau, Whitfield, Petrie, & Fryer, 1994). The authors conclude that "non-optimal parenting may contribute to the development of inappropriate strategies for coping with common pains of childhood, or of chronic pain patterns" (p.353), at least in some preterm neonates. After reviewing the various complex studies in the area of socialization of pain behaviour, Ross and Ross (1988) conclude that a child’s reaction to a painful stimulus is greatly dependent upon the response of the primary caregiver.

**Facial Expressions of Pain**

The ability to communicate about pain and its characteristics is of obvious importance to the sufferer. One particularly salient aspect of the expressive behaviour that occurs during pain is the nonverbal variable, facial expression. Information about the pain experience is encoded by changes in facial expression, which are then broadcast into the social world. In preverbal infants, where pain is particularly difficult to assess, facial expressions have been well researched (Craig & Grunau, 1993; Prkachin & Craig, 1995). Facial activity, evident from birth, may have developed adaptively as a specialized system for engaging adult care during times of suffering. Facial activity is social behaviour, used to serve several functions including soliciting aid and forming interpersonal ties (Prkachin & Craig, 1995). While personal characteristics may affect pain expressions later in life (e.g.,
what Ekman & Friesen, 1969, call “display rules”), there is a specific pattern of facial movements that is reliably associated with pain in healthy neonates (Grunau & Craig, 1987). The evidence shows that sophisticated facial action coding methods, used by trained observers, can be used to reliably assess infant pain (Craig, in press).

**Interpretation of Others’ Pain**

Complex psychosocial variables affect the interpretation of information about individuals’ pain states, and as a result, an observer’s decisions about the severity and nature of pain can be astute, or problematic. The general trend is to underrate the pain experiences of others (Chambers, Reid, McGrath, Finlay, & Craig, 1997; Landers, 1990; Prkachin, Berzins, & Mercer, 1994).

The influence of personal characteristics and beliefs can be considerable when objective clinical measures are not used for pain assessment. Observers bring different skills and sensitivities to their interpretation of facially expressed pain (Craig, Lilley, & Gilbert, 1996), and there is substantial empirical evidence of biased perceptions affecting judgement of others’ pain. Sometimes the biases seem related to personality factors within the observer. For example, nurturant women have been found to react to expressions of pain with more solicitude than non-nurturant women (von Baeyer, Johnson, & McMillan, 1984). As Hadjistavropoulos and colleagues (1990) have demonstrated, biased perceptions can also depend upon unrelated qualities of the sufferer. Hadjistavropoulos, Ross, & von Baeyer (1990) report that physicians took patients’ physical attractiveness into account when rating their pain and distress based on nonverbal pain expressions. These findings were confirmed
in a later study, when "unattractive persons were perceived to be experiencing greater pain intensity and unpleasantness" (Hadjistavropoulos, McMurtry, & Craig, 1996, p. 417).

When judging pain, the difficulties are compounded by the fact that observers are not only interpreting the subjective experiences of another, but are also integrating their own subjective pain experiences and empathic response capabilities (Bush & Harkins, 1991). Prkachin and Craig have developed a pain judgement model that includes a filter, reflecting the higher-order cognitive interpretations that mediate judgement and may lead to characteristic errors concerning a sufferer’s internal state (1995). The authors conclude that each observer’s perception of another’s pain has a gain function that may amplify, attenuate, or distort their estimate.

**Memory for Pain**

Accuracy of pain memory is a young and largely unexplored area of research (Eich, 1993). Of the studies that have been conducted, however, most conclude that retrospective self-reports of pain are generally trustworthy. In a qualitative review of the literature, Erskine et al. (1990), reported that recall is moderately accurate, although they cite some methodological problems with previous research. Two factors that seem to exert the greatest influence on pain retrospection are extent of current pain, and interval length between pain and recall (Eich, 1993). Eich and colleagues (Eich, Reeves, Jaeger, & Graff-Radford, 1985) demonstrated that, in a headache sample, participants’ present pain intensity predicted their pain ratings.

Current mood appears to have little influence on memory for pain, as demonstrated by experimentally induced mood manipulations (Smith et al., 1993). All studies reviewed
pertained only to memory for sensory intensity of pain. Apparently, memory for other pain dimensions has not been investigated.

**Summary**

Although ubiquitous to the human experience, pain remains enigmatic in terms of diagnosis. Pain is considered to be multidimensional. Complex psychological factors are intertwined with the sensory facet, making it difficult to assess the dimensions independently. The experience of pain, and pain behaviour, including the communication of pain, reflect psychosocial influences. The impact of experience and socialization of pain expression/interpretation begins early in infancy, and sensitivity to the social context provides the grounds for parental modeling of maladaptive patterns of pain expression. Judgement of others’ pain is highly subjective and occurs within the context of the observer’s own experiences and biases. Assessment of infants’ pain is compounded by lack of verbal cues, but the existence of a specific “pain face” in neonates provides a reliable assessment tool for trained judges. When remembering one’s own pain experiences, current pain status is the only variable found to significantly influence accuracy of recall.

**Somatization**

**Definition**

Somatization is a term that is “rich in surplus meaning” (Bakal, Hesson, & Demjen, 1995). Introduced by Stekel in 1908, the term referred to “... a deep seated neurosis akin to the mental mechanism of conversion,” (cited in Bass, 1990). Because of the pejorative connotations linking it to hysteria and hypochondriasis, it may be preferable to redefine somatization in terms of heightened somatic awareness, where somatic awareness is defined
as the process by which we perceive, interpret, and act on the information from our bodies. Lipowski’s definition (1988) is “a 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.” Dworkin (1993), avoiding any mention of pathology, has defined somatization as “first experiencing a bodily sensation, then interpreting it negatively as a symptom requiring attention, and eventually behaving in accordance with that interpretation.” He points out that somatization involves perceptual, cognitive, and behavioural processes. Contemporary definitions within psychology now de-emphasize the role of unconscious defense mechanisms and neuroses.

**Emotional Functioning and Disease Processes**

The theory of bi-directional communication pathways between the brain and the immune system has gained currency with the advent of a relatively new field of study -- psychoneuroimmunology (PNI). PNI is the study of interactions between behaviour, the nervous system and immune processes (Maier, Watkins, & Fleshner, 1994). Obviously, psychological factors cannot directly affect the functioning of lymphocytes (the “T-cells” critical to immunity), but rather are presumed to achieve their effect through the release of peripheral hormones that modulate immune processes (Maier, et al., 1994). The interface is believed to be much more elaborate than an emotional stressor indirectly “causing” compromised immune functioning. One way that complexity is introduced is by the interaction of a number of additional modulating factors such as personality traits and coping processes (e.g. Fredrikson, Furst, Lekander, Rotstein, & Blemgren, 1993).
Although the name (PNI) is new, the idea of stressors influencing health is not. Selye (1978) suggested a model depicting how emotional suppression can interfere with the actions of the immune system and contribute to a wide variety of disease processes. A number of investigators have theorized that emotional inexpressiveness is related to physiological arousal, stress, and illness (Buck, 1984). The implication is that individuals who do not show emotions spontaneously, whatever the reason, (i.e., due to suppression, absence of emotions, or failure to interpret emotions) exhibit evidence of high autonomic arousal which contributes to disease, and researchers have indeed found this quality of reduced emotional expressiveness in patients with a variety of somatic complaints (Flannery, 1977; Hollaender & Florin, 1983; Nemiah & Sifneos, 1970).

Within the cancer mortality literature, an accumulating body of evidence suggests that suppression of negative emotions is associated with poorer prognosis (Epping-Jordan, Compas, & Howell, 1994), and psychological interventions aimed at increasing emotional expressiveness have a positive influence on immuno-functioning and survival (Spiegel, Bloom, Kraemer, & Gottheil, 1989). Putting events into words seems to help people organize, make sense of, resolve, and ultimately get past their ruminations. Pennebaker, in a 1993 study, found that the tendency to relate emotional experiences to others was related to lower physiological stress reactivity. Some researchers attribute the link between emotions and disease to avoidance, a deliberate suppression of troubling thoughts and emotions (Epping-Jordan, et al., 1994), while others do not distinguish between conscious suppression and other lack of affectivity. Anderson (1981) reported that participants’ degree of facial expressiveness was negatively associated with stress arousal measures, and
Malatesta, Jonas and Izard (1987) found low facial expressiveness (as rated by judges blind to subjects’ illness state) to be significantly related to a higher number of physical symptoms including skin disorders and arthritis.

**Emotional Functioning and Symptom Reporting**

As well as being associated with increased risk of experiencing physical symptoms, maladaptive emotional functioning may relate to a tendency to report physical complaints. Pennebaker (1982) views the tendency to report symptoms as a stable construct, and, from his series of studies, concluded that a “symptom reporter” is likely to be an individual with constricted emotional functioning, who is socially insecure and isolated. Symptom reporting, as a trait, is presented as a risk factor for increased physical and mental health difficulties (Pennebaker, 1982). This implies that individuals with constricted emotional functioning would report more somatic symptoms than others, an idea for which Lane and Schwartz have found support.

Lane and Schwartz (1987; 1992) propose that people conceptualize and present their emotional difficulties at different levels, the lowest and most basic levels being bodily distress and somatic sensations. These authors conceive of emotional awareness as a hierarchy, where subjective qualities of emotions are experienced in a series of five levels. Increasing steps in the hierarchy suggest increased corresponding increases in flexibility, self-regulation, and adaptation. Awareness of emotions as bodily sensations represents the first level; the steps rise in complexity to levels four and five -- awareness of differentiated emotions, and finally, rich differentiations of quality and intensity. These authors also suggest that the ability to describe emotions follows the same hierarchical stages: from the
first stage where they are described as bodily sensations, to stage five where a description of
complex and differentiated states is possible (Lane & Schwartz, 1987). The message of
Lane and Schwartz is clear: a limited emotional repertoire, wherein feelings can only be
described as physical symptoms, is not likely to lead to optimal states of physical health and
psychological well-being.

Socialization and Somatization -- an Intergenerational Transmission Approach

Just as pain behaviour is influenced by early social factors, there is evidence that
familial experiences can influence the ways in which children attend to, organize, and
interpret many bodily sensations and emotions. Following the decline in popularity of
simple reinforcement theory, and the lack of empirical validation of the psychoanalytic
model of socialization of children, Bandura is usually credited with providing the earliest
and most persuasive studies showing that exposure to models can modify a child’s cognitive
and social development (Bandura, 1969; Bandura & McDonald, 1963).

Within the developmental literature, empirical support has been found for the idea
that characteristic ways of thinking and behaving can be transmitted intergenerationally,
from the primary caregiver to the infant. Although parents are not the only agents
contributing to the socialization of children, parent-child relationships occupy a central place
in most conceptions of the socialization process (Maccoby, 1992).

John Bowlby (1969) outlined this process in terms of attachment theory, which
inspired several lines of research indicating that, as Rothbard and Shaver (1994) conclude, a
mother’s sensitivity, affective characteristics, and patterns of interaction all play a vital role
in the development and maintenance of attachment style of her offspring. One theoretical
mechanism wherein intergenerational transmission may occur involves the internal working model, conceptualized as an internalized model of the self and others (Main, Kaplan, & Cassidy, 1985). As a hypothetical construct, the concept of an internal working model has some validity. Acquired in infancy via transactional patterns between caregiver and infant, the internal working model determines how the growing infant will interpret and respond to the behaviour of others, as well as how the infant views its own behaviour (Bretherton, 1990). Internal working models are fairly stable and change-resistant (Steele & Steele, 1994).

The idea of intergenerational transmission has been broadened to include concepts other than attachment. Van IZjendoorn (1992) defined intergenerational transmission as "the process through which, purposively or unintentionally, an earlier generation psychologically influences attitudes and behaviour of the next generation."

This framework of intergenerational transmission, via internal working models, lends itself to the transmission of somatization patterns. Evidence suggests that affective and somatic cues seem relatively undifferentiated at birth (Piers & Curry, 1985). Bush and Harkins (1991), in their discussion of emotional differentiation in children, present evidence that the parent-child relationship is paramount in influencing how the child defines illnesses. Clinical tradition has long asserted that "pain prone" families exist (e.g., Apley, 1975), and children’s somatization patterns correlate with those of their parents (Mikail & von Baeyer, 1990). The authors describe studies where families of children with somatic complaints frequently use physical explanations to deal with emotional distress. Such children are often characterized by mothers who are overly concerned with their children’s illnesses but poorly
informed about their emotional needs and stresses (Hughes & Zimin, 1978). When parents interpret children’s emotional signs as illness, the result could be abnormal illness behaviour in those children (Craig, 1983).

While the Bowlby-tradition models are insightful and richly elaborate, the concept of an internal working model is hard to operationalize and to demonstrate empirically. Other researchers have described the transmission of belief systems in other ways. Karoly (1991), for example, thinks of symptoms as psychosocial constructions, and has proposed a psychosocial elaboration model (PEM), similar to Bowlby’s internal working model. The PEM is based on the idea that any symptom is the product of interacting forces within a person and in the external world. The PEM serves to set boundaries on how much emotion is displayed and whether symptoms are enacted or suppressed. The PEM is thus an internalized, explicit theory organizing symptoms and influencing behaviour. In seeking to answer the question of why children in a family with somatizing parents display more somatic symptoms, Karoly’s model is very similar to models of intergenerational transmission via internal working models. Craig (1983), too, describes the process in similar terms: “The precepts of others become integrated with personal experiences of illness and other bodily events, as an individual’s concepts and beliefs of physical sensations develop.”

It seems clear that familial influences are of paramount importance in the socialization of children. As Fonagy and colleagues (1994) have put it, “the infant’s mental experience of himself is gradually acquired, not through self reflection, but through careful observation of his caregiver’s mental state, locking within it the caregiver’s perception of his own feelings” (Fonagy, Steele, Steele, Higgitt, & Target, p.248). In other words, the
growing child sees how the caregiver perceives her/him, and incorporates that perception
into his/her own self image. That children tend to share their parents' beliefs, and that the
extent and quality of their reactions to sensations are consistent with those of their parents,
seems well documented.

Summary

It must be stressed that most of the literature connecting somatization with affective
functioning is based on correlational methods, where either of these variables could be
considered as the dependent variable, and inferences of causality are dubious. In addition,
reliance on retrospective accounts of family illness behaviour brings imprecision to the
socialization literature. As Craig (1986) points out, however, studies of experimental
modeling interventions provide convergent information on the impact of models on illness
behaviour. There does seem a definite though ambiguous relationship between emotional
inexpressiveness and disease, possibly operating via immunoregulation in some cases. Poor
emotional functioning also appears related to an increased tendency to report physical
symptoms. It also seems that there are people who characteristically tend to conceptualize
internal stimuli as illness. This manner of conceptualizing stimuli becomes automatic, and
shapes the way people interpret cues not only within themselves, but also in their
interpretation of the behaviour of others. The tendency to translate emotional changes in
terms of illness appears to begin in infancy and is highly susceptible to parental influences.

Social Communication

The Importance of Social Communication
Communication, according to Buck (1984), occurs when the behaviour of one person influences that of another, and behaviour can be considered communication when it reduces uncertainty in the behaviour of another. Successful social communication helps us master the world and enjoy a sense of connectedness and belonging (McAdams & Bryant, 1987). The social process is a fundamental operation, and, according to many social psychologists, positive relationships are considered of paramount importance to optimal human functioning. The ability to communicate with others and to use them as a source of social support affects both physical and psychological health and well-being, and prospective studies that control for baseline health status, have shown increased mortality among persons with few social relations (House, Landis, & Umberson, 1988). Jamison and Virts (1990) reported that social communication represented a valuable resource for chronic pain patients. In their study, patients who had access to a support network and tended to cultivate it, were able to manage their pain in a more adaptive manner. According to Smith and Mackie (1995), relationships affect virtually all aspects of our lives including physical health, and communication is an essential ingredient in forming relationships.

**Communication Skills and Interpersonal Functioning**

The concept of communication skill suggests that at least two component processes might be involved: (a) ability to emit suitable behaviours as elicitors of, or as responses to, others' communicative messages (expressive communication), and (b) ability to perceive and accurately identify interpersonal cues (receptive communication). Those with competence in both these areas of communication skill are viewed as more interpersonally desirable. For example, in the area of expressive communication, researchers have shown
that people who respond to social cues with appropriate body language tend to be liked more
than others (Mehrabian, 1972). In a refinement of Mehrabian’s studies, Zimbardo (1977)
found that those who make eye contact appropriately are also seen as more likable. A
listener who responds with sympathetic concern is liked more than one who fails to do so
(Berg & Archer, 1980). Appropriate levels of self-disclosure have been found to relate
positively to interpersonal functioning (Archer, Berg, & Runge, 1980), especially so when
one person has already made a disclosure (Friedman, Riggio, & Casella, 1988). When an
individual has been entrusted with a self-disclosure, a social norm is created, prescribing that
they should respond similarly. If the level of intimacy is not matched, the reciprocity norm is
violated, and the interaction is rated as less rewarding (Derlega, Wilson, & Thaikin, 1976).

In the area of receptive social communication, research suggests that when an
individual’s perceptions are limited or distorted, effective social encounters are hindered.
Discriminatory deficiencies are linked to impaired interpersonal functioning (Hayden,

In general, we are more attracted to those with whom we have positive interactions,
and these impressions can be long-lasting and resistant to change. Once formed, our
judgement of others’ likeability can influence our interactions with them. We treat others in
ways that reflect our impressions -- the “self-fulfilling prophecy”-- and these impressions are
thus prone to perpetuate themselves (Rosenthal, 1985).

The Role of Empathy

Empathy, defined by Shaver (1981) as the ability to experience another person’s
emotional state, plays a facilitative role in interpersonal communication. Empathy
contributes to accuracy in social perception, and is perceived as a highly desirable quality in others (Reis & Shaver, 1988). In a group of emotionally disturbed boys, those able to put themselves in the place of others and to predict the sequence of others’ behaviour displayed superior interpersonal functioning (Hayden et al., 1977). Listeners who respond with empathy are liked more than those who do not (Berg & Archer, 1980), perhaps because interacting with another person who treats us with warmth, acceptance, and understanding confirms our sense of being connected (McAdams & Bryant, 1987). A key factor in empathic ability is the capacity to identify with others’ emotional states (Shaver, 1981), and when this capacity is absent or impaired, the ability to empathize is also affected. The ability to adopt the psychological view of others, also known as perspective-taking, has been strongly implicated in adaptive social functioning (Davis, 1983), a finding that also applies to maternal relationships. Mothers scoring highly on perspective taking scales were found more likely to establish a successful system of reciprocity with their children (Kochanska, 1997).

Although perspective-taking, a cognitive process, is considered to be an important component of empathy, there are other significant components. Stotland (1969) suggested an affective dimension: a vicarious emotional response to the perceived emotional states of others. Although the current trend is to integrate both cognitive and emotional processes in studies of empathy, and measurements usually embody both facets, Mehrabian and colleagues surveyed and reviewed studies employing only an affective definition (Mehrabian, Young, & Sato, 1988). They report significant effects for a positive relationship between empathy and likeability. High-empathy individuals were more
affiliative, and parents of high-empathy children were found more verbally explicit about feelings.

A relatively new area in the study of empathy concentrates on what Ickes and colleagues call “empathic accuracy” (Ickes, 1993; Ickes, Stinson, Bissonnette, & Garcia, 1990), and define as the ability to accurately infer the specific content of another person’s thoughts and feelings. Empathic accuracy presented as a stable individual difference in undergraduates (Marangone, Garcia, Ickes, & Teng, 1995).

In a study exploring the physiological substrates of empathy, Levenson and Ruef (1992) drew three conclusions from an examination of the literature. First, they concluded that the ability to perceive accurately the feelings of another person represented the linchpin of the empathy construct. Without it, empathy would be impossible. Second, they recommend more stringent operationalization of empathy, and third, these authors underscore the risks of distorted findings due to social desirability of assessment techniques.

**Social Relationships and Physical Health**

People who are able to give and receive comfort from others appear to enjoy better physical functioning. Berkman, Leo-Summers, & Horwitz (1992), in a prospective study, reported that social support led to lower mortality following myocardial infarction, and a meta-analysis performed by Schwarzer and Leppin (1989) concluded that the effects of social support on physical health are pervasive. Social relationships appear related to effective immune system response; Keicolt-Glaser and Glaser found that individuals with supportive social relationships had higher T-cell counts (1992). Positive correlations have also been found between marriage and physical health. While not all social relationships are
necessarily salutary, reciprocated psychological intimacy seems to be the common factor that produces benefits (Pennebaker, 1990), and this intimacy can be found within a variety of social relationships. Individuals unable or unwilling to seek or offer emotional support sustain a barrier to the rewards of psychological intimacy (Collins & Read, 1990), and hence could experience poorer physical health than others.

**Importance of Nonverbal Behaviour in Communication**

Body language offers a special insight into people's moods and emotions, and nonverbal mood cues often can be deciphered with accuracy. In one study, for example, raters could identify the presence and intensity of anxiety on the basis of nonverbal cues alone (Waxer, 1983).

Even though facial expressions represent only one type of kinetic cue, they are considered of special relevance because of their importance in the communication of emotion (Ekman, 1972; Izard, 1977; Tomkins, 1963). Recognition of facial emotion is extremely important in social perception and communication (Shaver, 1981). Even though the relationship between emotional experience and emotional expression is controversial (Fridland, 1994), what is universally accepted is that faces are intimately involved in communication (Izard, 1990; Russell, 1994). Some researchers contend that facial expressive behaviour is the primary source of nonverbal affective communication (Ekman, Friesen, & Ellsworth, 1983).

**Summary**

Social communication, especially the formation of close relationships, is a vital ingredient in optimal physical and psychological functioning. Certain social behaviours and
capabilities that depend greatly upon interpersonal sensitivity (such as appropriate body language, reciprocity of self-disclosure, ability to decipher facial expressions of emotion, and empathy) have been found to relate to effective communication and social skill. A great deal of research has focused upon nonverbal behaviour, attesting to the centrality of nonverbal behaviour in the social communication process. When interpersonal sensitivity is impaired, there are difficulties in forming social relationships, and physical health may be affected.

**Facial Expressions**

**Faces and Emotions**

The salience of facial expressions when we try to gauge another's emotion has been demonstrated in the literature. Researchers have found that normal conversational distance (2-4 feet) makes it hard to monitor the body as a whole (Hall, 1966), so the face is normally the most prominent nonverbal feature during interaction (Collier, 1985). Study participants who view photographs of people tend to look mainly at the face and eyes (Yarbus, 1967), and Ekman and Friesen (1971) found that people prefer to use facial cues when limb motions provide alternate sources of affective information.

The face is well able to provide emotional information to the observer. Facial skin is amply endowed with sensitive receptors to subtle expressive movements (Izard, 1990), so while other body movements can depict liking, status, and arousal, only the face has sufficient differentiation to express discrete emotions (Collier, 1985).

**Judging Emotions from Facial Expressions**
People are generally quite accurate in judging emotions expressed facially (Pennebaker, 1982), even when the expressions are displayed rapidly. Accurate ratings have been obtained from exposures of only 375 milliseconds (Ambady & Rosenthal, 1992). Observers, regardless of cultural background, can accurately discriminate certain human emotions displayed facially (Ekman, 1982). There are, however, conditions under which people are less able to recognize and respond to facial cues. Depression, for example, has been found to impair accuracy in interpretation of facially expressed emotions (Feinberg, Rifkin, Schaffer, & Walker, 1986), and schizophrenics have been shown less accurate than a comparison group in identifying facial expressions (Zuroff & Colussy, 1986). Interpersonal difficulties are presumed to be linked to this inaccuracy (Persad & Polivy, 1993; Scharfe, 1994).

**Summary**

Facial expressions are important features of the interpersonal environment. They occur in most interactions and represent a powerful social stimulus. Since facial cues represent a salient component of social interactions, inaccuracy in decoding these cues is likely to impair empathic skill and social performance.

**Overall Summary and Rationale for the Study**

There is a burgeoning literature addressing the topic of alexithymia, but many areas remain in need of elucidation. The research on alexithymia and affect suggests that individuals with high levels of this personality feature may demonstrate insensitivity to affective states in both themselves and others, and that they are socially awkward. Little research has been conducted to explore mechanisms whereby their insensitivities translate
into interpersonal inadequacy. A review of the literature informs us that people who inaccurately decipher and inappropriately respond to facially expressed affect are less interpersonally accomplished than others. An investigation into the ability to accurately "read" and appropriately respond to emotions in others' faces may reveal an association between alexithymia and impaired capacities in these areas. If so, this low ability could be a mechanism of their social insensitivity and poor interpersonal competence.

The literature on alexithymia and symptomatology reveals that alexithymia is overrepresented in samples of people who report many physical symptoms, and that alexithymia is particularly likely among those who seek treatment for chronic pain. Research instruments available to assess multiple dimensions of pain offer the opportunity to conduct a finer-grained investigation of how pain is conceptualized, focusing on the sensory and affective dimensions. Pain literature stresses the significance of both these dimensions in terms of sensitivity to others' pain, and also stresses the role of both sensory and affective components in terms of successful participation in multidisciplinary chronic pain management programs.

Despite the importance of a multidimensional view of pain, and the availability of tools to assess components separately, a review of the literature reveals no such multidimensional investigations of the way pain is experienced or conceptualized by those individuals characterized by alexithymic features. We know from the literature that some people tend to stress the sensory component of pain, while ignoring the emotional component. If study participants with high levels of alexithymia were shown to be characterized by such a pattern with regard to their own pain, such a finding would explain
to some extent the association between alexithymia and the tendency to emphasize somatic symptoms. This finding would also imply that, for such patients, pain management techniques that rely on affective insight may be ineffective.

Reviewing the literature on alexithymia reveals it to be manifested both as an enduring trait and as a temporary state. While the latter is thought to be a reactive coping strategy under deeply stressful conditions, trait alexithymia is seen as either subtle neurological pathology, or as a personality style originating in infancy. It may also, of course, represent an interactive product of both. Scant empirical research has been found to confirm or disconfirm these hypotheses. There is a wealth of research demonstrating that maladaptive attributes can be acquired in infancy, through interacting with an insensitive caregiver. If a relationship were shown to exist between alexithymia and insensitive perception of infants' pain signals, the literature suggests that the infant may develop a maladaptive view of pain and other somatic sensations. The judgement of persons with high levels of alexithymia may be characterized by a pattern whereby the sensory component of infant pain is stressed, while the emotional component is ignored or dismissed. A caregiving style constantly distinguished by such a pattern may engender alexithymic attributes in infants. The literature informs us that attributes thus acquired are enduring and self-perpetuating.

**Overview of Methodology**

This series of three studies investigated whether alexithymia is associated with: (1) inaccurate and inappropriate reactions to the affective expressions of others; (2) atypical perception of infant pain; and (3) an atypical pattern of recalled pain experiences. The basic
design was one in which correlational analyses were used to examine associations between alexithymia and the perception of others' emotions, between alexithymia and judgement of infant pain, and between alexithymia and the conceptualization of participants' own pain experiences. Alexithymia was assessed using the Toronto Alexithymia Scale (TAS-20), and an exploratory factor analysis was conducted to check the factor structure of the TAS-20. Current mood, level of verbal fluency, extent of current pain, and amount of caregiving experience were assessed and examined as possibly affecting the relationship between alexithymia and dependent variables.

This series of studies was conducted using a non-clinical sample. The main limitation associated with the use of non-clinical participants is that findings may not generalize beyond the study sample, and may not apply to clinical patients. Nevertheless, it was decided to use a non-clinical sample for several reasons. Some authors have recommended that patterns of somatic complaints should be investigated with non-clinical participants. For example, Sullivan and Katon (1993) caution that sole use of clinical populations may distort the understanding of somatization. First, focusing on clinical individuals informs us only about the most chronic and disabled samples of the population. Second, many individuals in pain clinics view their situation as contentious since they are often engaged in a struggle to have their pain seen as legitimate; thus they may be defensive and guarded in their responses. Third, sole use of pain clinic patients informs us only about people whose symptoms persist only after organic causes have been ruled out (Sullivan & Katon, 1993). Also, clinical populations become experienced test-takers; they have been through the healthcare "papertrail" and their answers may no longer be spontaneous; they may now
represent mere ritualized formula responses. Similarly, researchers have urged that non-clinical samples be used to study alexithymia. For example, Faryna, Rodenhauser, and Torem (1986) point out that study participants are often selected from patient populations, and these authors recommend that normative data be collected from non-clinical samples. It should be pointed out that, although the current sample is referred to as non-clinical, some participants may actually have been receiving treatment for their pain conditions.

Traditionally, alexithymia as measured by the TAS has been interpreted by factor scores rather than solely by global scores. While subscales are available from other sources, researchers have suggested confirming the factor breakdown of the TAS-20 with each new sample (e.g., Haviland & Reise, 1996). Since non-patient pain populations are rarely studied, it was decided to expose the data to factor analysis to discover whether previously found factors could be confirmed in this sample.

The general approach to each of the three studies follows.

**Study 1: Facial Expressions of Emotion**

Ninety female undergraduates, varying in the extent to which they displayed alexithymia, examined slides of posed facial expressions of emotions. They were required to identify the emotion being expressed, estimate its intensity level, report their affective reaction to the expression, and to indicate their probable behavioural response.

**Study 2: Infant Expressions of Pain**

The same participants viewed videotapes of neonates undergoing a heel lance. They were asked to rate the sensory level of pain inflicted on each infant, and to rate the affective
distress of the infants. They responded to a question asking how they would deal with a child’s reaction to inoculation pain.

**Study 3: Rating of Own Pain Experience**

Participants completed a questionnaire about a recent pain experience they suffered. They rated, retrospectively, the sensory and affective qualities of that experience. Since presence and intensity of current pain, and interval length between pain and recall have sometimes been found to influence retrospective accounts of pain, the questionnaire included these items. During a brief interview, participants responded to questions regarding the effect of pain on their lives.

**Hypotheses**

There were several experimental hypotheses tested in this study:

**Study 1: Facial Expressions of Emotion**

Alexithymia was expected to be associated with inaccuracies in identifying emotions from the facial expressions of adult models, and also with a pattern of perceiving the emotions as low in intensity.

Individuals displaying alexithymia appear deficient in characteristics necessary for empathy -- for example, the ability to discriminate emotional states. It was anticipated that this reduced empathic proficiency, together with poor interpersonal skills, would lead such individuals to report avoidant behavioural responses to the facial expressions of adult models.
Persons characterized by high levels of alexithymia were expected to report experiencing emotions incongruent with those of the models, and to rate them as lower in intensity.

**Study 2: Infant Expressions of Pain**

Alexithymia was expected to be related to higher estimates of sensory qualities of infant pain, and lower estimates of affective distress of infants. It was anticipated that the women displaying alexithymic features would be more likely to suggest strategies for dealing with child inoculation that failed to deal with affective distress experienced by the child (for example, suggesting that children should close their eyes during the procedure, but not suggesting that they would comfort the child).

**Study 3: Evaluation of Own Pain Experience**

With regard to the subjective experience of pain, it was hypothesized that alexithymia would be associated with higher subjective ratings of the somatic qualities of pain and lower subjective ratings of affective distress. During the interview, it was expected that participants characterized by high levels of alexithymia would report mainly physical discomfort and little affective distress.
Method

Participants

Participants were female undergraduates at UBC (aged 17-53 years; \( M = 21.65; SD = 6.14 \)), recruited through their psychology classes or via bulletin board notices in the Psychology Building (see Appendix A). While ethnicity was not recorded, apparently the sample group consisted of Caucasian and Asian students. Since gender differences have been found in both alexithymia and pain research (Hendryx, Haviland, & Shaw, 1991; Taylor, 1984; Unruh, 1996), gender differences were eliminated by recruiting only female participants. Time and financial constraints precluded the recruitment of an equal number of men in the sample group; female undergraduates outnumber males by 65.6% to 34.4% in the Arts Faculty at the University of British Columbia, and it has been found that women are much more likely to volunteer their participation in research studies. Volunteers were either paid $10.00 for their participation, or awarded 1-1/2 extra course credits. Female students were invited to participate if they had experienced a painful condition lasting at least one week at any time during the past year. These instructions were designed to increase the chances of finding a sample with a higher base rate of alexithymic characteristics than the general population. The rate of alexithymia in the general population has been estimated at between two and ten percent (Linden et al., 1994), whereas rates in chronic pain clinics range as high as 66% (Sivik, 1993). Many differences have been found between chronic and acute pain (Bush & Harkins, 1991), but the temporal boundary between the two is not clear. To reduce variability, pain definitely of an acute nature (i.e.,
extremely short-term in duration) was excluded by including only students whose pain experience had exceeded seven consecutive days.

After data on 70 participants were collected, there were only ten who scored at or above the suggested cutting score of 61 on the TAS-20 (Bagby, Parker, & Taylor, 1994). In order to increase the number of individuals with high alexithymia scores, a further 75 participants were first screened with the TAS-20, resulting in another 17 alexithymic participants.\(^1\) This strategy yielded a total N of 145. All participants completed the TAS-20, and all 145 were used for the factor analysis; only 90 of these completed the remainder of the tasks. Data on all participants was collected between May and September.

**Materials**

*Toronto Alexithymia Scale.* (TAS-20; Bagby, Parker & Taylor, 1994).

Alexithymia was assessed with the TAS-20 (see Appendix B). Measurement of alexithymia has been contentious, with many scales being criticized for poor psychometric properties and insufficient or contradictory research findings. The TAS was designed to address the methodological problems in the development of existing scales for measuring alexithymia. It was devised to be theoretically congruent with the alexithymia construct, independent of social desirability, and internally consistent. The psychometric properties of the TAS have been well validated by others. Linden et al., (1994) conducted extensive reviews of several popular measures, and concluded that the Beth-Israel Questionnaire (BIQ; Sifneos, 1973) and the TAS (Taylor, Ryan, & Bagby, 1985) were the best-supported instruments for

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\(^1\) As can be seen from Tables 5(a) and (c), correlations between TAS-20 scores and other participant variables were similar for participants 1-70 and 1-90. The addition of twenty "screened" participants did not change the pattern or direction of these associations.
assessments of alexithymia. The BIQ has been criticized elsewhere as lacking validity (Bagby, Taylor, & Parker, 1988; Taylor, 1987), and for having low interrater reliability (Shipko & Noviello, 1984). It is also lengthy to administer and score, and requires considerable training to administer. Moreover, some investigators have found that scoring may vary depending upon the experience, bias, and style of the interviewer (Taylor & Bagby, 1988). Linden et al. (1994) report that the BIQ may reflect changing situational variables during the interview, and describe it as confounded with denial tendencies.

When the TAS was first developed, the authors selected five content areas from the literature that were thought to reflect the domain of the construct, and wrote items around these five content areas. The areas were (1) difficulty in describing feelings; (2) difficulty distinguishing between feelings and bodily sensations; (3) lack of introspection; (4) social conformity; and (5) impoverished fantasy life. Nonetheless, once the TAS was factor analyzed, the test authors adopted a 4-factor, 26-item scale. The factors were named: (1) capacity to identify and distinguish between feelings and bodily sensations; (2) capacity to describe feelings to others; (3) tendency to daydream; and (4) an externally-oriented cognitive style (Taylor et al., 1985). The TAS has been revised twice, leading to the daydreaming scale being dropped. The TAS-20 (Bagby, Parker & Taylor, 1994) is a revision of the TAS, and consists of 20 self-descriptive statements, each rated on a 5-point scale range from 1, (strongly disagree) to 5 (strongly agree). The authors subjected the TAS-20 to factor analysis, and found a three factor structure: (1) capacity to identify feelings and distinguish them from bodily sensations; (2) capacity to communicate feelings to others; and (3) externally oriented thinking. Others have factor analysed the TAS and its
revisions (Kroner & Forth, 1995; Kirmayer & Robbins, 1993, and others), and researchers have recommended conducting factor analyses with different samples (e.g. Haviland & Reise, 1996).

**Beck Depression Inventory.** (BDI; Beck, Ward, Mendelson, Moch, & Erbaugh, 1961). This is a 21-item self-report measure used to assess depression. It is widely used and has adequate validity and reliability. The BDI has been criticized for assessing distress (rather than depression) in some people (e.g., Coyne, 1994), but researchers do agree on its utility as a screening tool for depression, since it taps low mood. Alexithymia is associated with depression, and most researchers believe the two are conceptually different, although not independent. The BDI contains items that may be endorsed by individuals who are preoccupied by physical symptoms (de C Williams & Richardson, 1993). Although some researchers feel that the BDI is able to discriminate depressed from non-depressed pain patients (Turner & Romano, 1984), endorsement of these somatic items may result in inflated depression scores for some subjects. Burckhardt & O’Reilly (1994) suggest raising the cutoff point to 15 for separating depressed from non-depressed patients, but in this study, the possibility of inflated scores has been addressed by analyzing somatic items separately. Thus, a modified BDI score was obtained, representing scores from items 1-14, and omitting scores from items 15-21.

**Verbal Fluency Test.** (Benton & Hamsher, 1978). This test (Appendix D) forms part of an eight part battery to evaluate loss of verbal functions (Multilingual Aphasia Examination; Benton & Hamsher, 1978). Each subtest can be administered and scored separately. To give the test, an examiner asks the participant to say as many words as
possible beginning with given letters of the alphabet (F, A, and S). The score is the sum of all acceptable words produced in 3 one-minute trials (one minute per letter).

**Evaluation of Facial Expressions of Affect**

Stimuli consisted of a set of 14 photographed facial expressions, prepared as 35mm slides, developed by Matsumoto and Ekman (1992) to depict happiness, sadness, anger, surprise, fear, contempt, and disgust. Each emotion is portrayed twice: once by a male and once by a female model. The slides were developed by Matsumoto and Ekman to provide a stimulus set to meet external criteria for both reliability and validity, and to include both Japanese and White male and female posers. In the development of this stimulus set the authors coded a pool of photographs selected for possible inclusion using Ekman and Friesen’s Facial Action Coding System (FACS; Ekman & Friesen, 1978). Reliability and validity data were compiled by obtaining observer ratings of emotions, and the final set of photographs was selected based on degree of agreement on the intended emotion (Matsumoto & Ekman, 1992). Reliability has also been demonstrated in subsequent studies (e.g. Biehl, Matsumoto, Ekman, Hearn, Heider, Kudoh, & Ton, 1995).

A rating form was provided for each slide, together with 3 sets of 3” x 2” emotion cards (see Appendices E and F) allowing participants to: (a) identify the emotion(s) being expressed, (b) assess the intensity of emotion(s), (c) consider three potential behavioural responses (desire to approach the person, no response, desire to avoid the person), and (d) report their emotional reaction to the picture. Intensity of emotion was rated using a 10 cm line as a visual analogue scale (VAS). The line was anchored as “least possible expression” and “strongest expression imaginable.” VASs are considered to be intuitively simple for
participants. Although some researchers suspect that anchoring may produce biases (Price & Harkins, 1992) most studies have found no such distortions (e.g., Duncan, Bushnell, & Levigne, 1989), and VAS measures are generally considered to be bias-free ratio scales (Price & Harkins, 1992). The optimum length of VASs for sensitivity in delineating extremes have been estimated at 10-15 cm in length (Seymour, Simpson, Charlton, & Phillips, 1985).

Though only seven different emotional states were portrayed in the slides, participants could select from nine possible “emotion cards,” because “indifference” and “pain” were added. Similar methodologies have been used successfully to detect significant differences in judgement of, and responses to, facial expressions with insecurely attached populations (Scharfe, 1994), and depressed individuals (Persad & Polivy, 1993). The emotions used are considered by some researchers to be primary human emotions, ones for which there is usually high inter-judge accord (Ekman, 1982). Although universal agreement may decline when participants are free to select any number of labels -- as in the current study -- rather than being limited to a choice of one (Russell, 1989), external validity increases with freedom of choice (Russell, 1994), and responses can be treated as independent. When participants also assess the dimension of intensity, a richer interpretation of their responses becomes possible (Russell, 1989).

**Evaluation of Infant Pain**

The stimulus set consisted of an edited videotape of 24 neonates undergoing heel lancing in a hospital. Use of 24 stimuli was expected to result in stability of evaluation scores within participants. These videotapes were taken for the purposes of another
research study (Craig, Whitfield, Grunau, Linton, & Hadjistavropoulos, 1993), and parental and hospital consent was obtained prior to videotaping. Only the infants’ faces appear on the videotapes, with the time and date on the top left of the screen, and the sound level set at zero. The video clips were extracted from longer tapes that include a baseline period, preparatory swabbing, heel lance, and recovery. The video clip of each baby consisted of the two seconds immediately following penetration of the skin by the lance. There was a 20 second period of blank tape (blue screen) in between each baby, to permit ratings.

Using sensory and affective verbal descriptor scales (Gracely, McGrath, & Dubner, 1978), participants rated two dimensions for each video clip. The first dimension was the sensory magnitude of the stimulus being applied, and the second dimension rated was the amount of affective distress experienced by the infant. The rating sheets are included as Appendix G. The verbal descriptor scales provide 13 descriptive adjectives, arranged in a hierarchical list, applying to sensory magnitude (from “Extremely intense” to “No pain”) and 13 applying to affective qualities (from “Very intolerable” to “No distress”). Relative magnitudes of the words within each of these two dimensions have been quantified in the form of ratio scales using cross-modality matching procedures (handgrip dynamometer force and verbal descriptors), and reliability and validity have been demonstrated (Gracely & Dubner, 1987). Cross-modality procedures are used to transform verbal ratings to scales more likely to have ratio properties (Price & Harkins, 1992). Participants provide ratings of the severity represented by each word in reference to one or more other modalities, and these ratings then yield the score for the word. To the extent that the selected modalities themselves possess ratio scale attributes, the verbal ratings should also possess these
attributes (Jensen & Karoly, 1992). These scales have been preferred over other types of rating scales because of their psychophysical properties (Chapman, Casey, Dubner, Foley, Gracely, & Reading, 1985), and because two dimensions are assessed: sensory intensity and affective distress (Price & Harkins, 1992). Some researchers are critical of the cross-modality matching approach for assessing fluctuations in patients’ levels of pain. Hall (1981), for example claims that a simple rank scoring method is easier to use and just as effective. In this study, however, the scales are used on a single occasion only.

**Evaluation of Own Pain Experiences**

Participants completed a questionnaire asking them to recall and describe a time during the past year when they experienced pain that lasted more than one week (Appendix H). The questionnaire also asked for the date and duration of their pain experience, and for an estimate of the extent of their current pain, on a scale from 0 to 100, anchored at “No pain at all,” and “The worst pain you’ve ever had or could imagine.” The questionnaire included verbal descriptor scales (Gracely, et al., 1978), to enable participants to rate their pain, retrospectively, on recalled levels of sensory intensity and emotional distress.

**Experimental Procedures**

The research was conducted by the primary investigator and two trained research assistants, using interview rooms at UBC. All research assistants who were involved in coding were blind as to the level of alexithymia in the participants. All procedures were carried out individually for each participant. Participants were provided with information about the nature of the study. They were told that the purpose of the study was to investigate whether personality differences influence the way people think of pain and
emotion. Participants completed a consent form, and were notified that they may withdraw at any time without penalty (Appendix I). Participants then completed a brief demographic questionnaire, asking their date of birth and number of children, and also asking them to estimate the extent of their caregiving experience from 1 to 5 (Appendix J). Next, they completed the TAS-20 and the BDI. Studies 1, 2, and 3 were then conducted, with the order of study counterbalanced among participants.

Procedures applying to each study will be described in detail in separate sections below.

**Study 1: Facial Expressions of Emotion.**

Participants were seated at a desk, in a partially darkened room. A Kodak slide projector was set up with a carousel containing the 14 colour slides from Matsumoto and Ekman's (1992) stimulus set containing the head and shoulders of models depicting 7 different facially expressed emotions. Order of presentation of slides was pre-arranged in randomized order for each participant. Operation of the slide projector was demonstrated, and participants were given a remote control to advance the slides.

Participants were instructed to read the rating form, and they were encouraged to ask for clarification, if necessary. They were then informed that they would view 14 slides of posed emotional expressions and rate each slide 4 ways: name of the emotion, intensity of the emotion, their likely behavioural reaction, and their likely emotional reaction. Participants were asked to mark a point on the VAS to represent their estimate of the intensity of the emotional expression on each slide. Ratings of the other three dimensions were done using labeled cards. Three piles of cards were presented to participants. The first
pile contained 9 cards, each with one emotion inscribed. Participants were asked to choose one or more cards to reflect their judgement of the emotional content of each slide. They were informed that they could also write additional emotions on the rating sheet, if they wished, and that they were required to indicate an intensity level for each emotion selected. The second pile contained 3 cards, each with one potential behavioural reaction (approach, neutral, avoid). Participants were instructed to imagine they had met a stranger bearing the emotional expression posed in the slide, and to choose one or more cards to represent their predicted behavioural reaction. They were advised that they could also write additional behavioural responses on the rating sheet, if they wished. The third pile consisted of a duplicate set of the first pile -- i.e., 9 emotions. From this third pile, participants were asked to choose one or more cards to reflect their own likely emotional reaction, should they meet a stranger bearing the posed emotional expression on the slide. Once again, they were given permission to record additional emotional reactions on the rating sheet, in lieu of, or as well as, one or more of the nine cards.

Once they had read the instructions on the rating form and indicated their understanding of the procedures, they advanced to the first slide and proceeded to view and rate each of the 14 slides for emotion label, intensity of emotion, own emotional response, and own behavioural response. They were instructed to proceed at their own pace, and a researcher remained present, though inconspicuous, throughout the proceedings.

**Study 2: Infant Expressions of Pain**

Participants were seated in front of a television set and video cassette recorder, in a partially darkened room. Prior to the arrival of the participant, researchers prepared the
equipment by inserting a videotape containing edited film clips of infants, advancing it to
the appropriate starting point for each participant, and depressing the pause button. The
order of presentation of the video clips was sequentially randomized (i.e., although the
pictures were shown in the same order, each participant’s set began at a random number
from one to twenty-four). Operation of the equipment was demonstrated, and participants
were given a remote control to pause and restart the tape. Participants were instructed to read
the rating form and they were encouraged to ask for clarification, if necessary. Once they
had read the instructions on the rating form and indicated their understanding of the
procedures, they began playing the tape and providing ratings. The researcher remained in
the room, inconspicuously, to ensure that instructions were understood and to handle any
problems or questions.

After all 24 babies had been viewed and rated, a brief, semi-structured interview was
administered by the experimenter or a trained assistant. Responses were audiotaped for
future coding and analysis. The interview questions were:

*Please imagine that you are the mother of a five year old child who you will be
taking to the clinic for a routine vaccination. What are some of the ways you might prepare
the child for this experience? How would you deal with the child during the procedure?
How would you treat the child directly after the procedure is over? (See Appendix K for
instructions to the interviewers).*

**Study 3: Evaluation of Own Pain Experience**

Participants were asked to recall the pain experience to which they had referred when
they volunteered for the study. Participants were instructed to read the questionnaire and
rating sheet, and were encouraged to seek clarification, if necessary. Once they indicated their understanding, they were asked to complete both the questionnaire and the rating sheet.

During a short audiotaped interview, participants were asked to respond to the following questions:

_I would like to know more about the pain you have referred to. Would you tell me some things about it? How did you feel? Did the pain change over time, or did it remain at a constant level? What made it feel better or worse? How did it affect your life?_ (See Appendix L for instructions to the interviewers).

Once procedures for the three studies were completed, the word fluency test was administered to each participant. The examiner used a stopwatch for accurate recording of each of the three one-minute trials in the word fluency test. Once all study tasks were completed, each participant was handed a debriefing form (Appendix M) to read and take away.

**Data Reduction and Analytic Strategies**

All statistical analyses were performed using SSPS for Windows. An alpha level of .05 was used for all statistical tests, except where explicitly stated otherwise. All research assistants who were involved in coding were blind as to the level of alexithymia of the participants.

**Factor Analysis.**

Before factor extraction of the TAS-20, the psychometric adequacy of the scale’s interitem correlation matrix was confirmed with the Kaiser-Meyer-Olkin measure of sampling adequacy (Kaiser, 1970), and sphericity was ruled out using Bartlett’s test. The 20
x 20 correlation matrix was then subjected to maximum-likelihood and principal-components analyses. To decide how many factors to retain, the following information was obtained: (a) a scree plot of eigenvalues plotted against factors; (b) number of eigenvalues greater than 1; and (c) a likelihood ratio test. Since some factor interdependence was expected, an oblique rotation was chosen rather than forcing orthogonal factors.

**Partial and Semi-partial Correlations.**

The effect of depression was partialled out of all correlations involving the TAS-20 and its factors. This was accomplished by performing partial correlations, thereby removing the variance contributed by modified BDI scores (non-somatic depressed mood items) from both variables in each correlation.

Other factors thought likely to affect some dependent scores were: amount of caregiving experience, extent of current pain, time elapsed since the pain experience, and verbal fluency. The effects of these potentially confounding variables were assessed by correlating these variables with the dependent variables considered salient. Relationships were thus explored between caregiving experience and evaluation of infant pain, between extent of current pain and assessment of own and infant pain, between verbal fluency scores and all dependent measures. Correlations were evaluated using a very liberal $p$ value of .10, and the effects of any relationships considered significant by this criterion were controlled by performing semi-partial correlations, thus partialling out the variance contributed by the confounding factor from the dependent variables only.

**Study 1: Facial Expressions of Emotion**

**Ratings Of Emotional Expressions.**
An index of accuracy was calculated to evaluate participants' labeling of the facial display slides. A value of 1 was awarded for each posed facial display of emotion accurately identified. It will be recalled, however, that participants could select any number of emotions from the cards, or add one or more of their own. Accuracy scores were therefore modified by the total number of responses provided for each slide such that 1 represented a perfect score, a score of .5 represented one correct and one incorrect label, and a score of .25 represented one correct and three incorrect labels. Scores of zero were given when the correct emotion was not selected, regardless of the number of responses. For each slide, scores ranged from 0-1. Thus each participant's possible range of scores, summed across all 14 slides, was 0 - 14.

Consideration was given to collapsing the participants' rating scores across the 7 modeled emotions, or across the genders of model. To investigate the possibility of a statistical justification for performing such data reduction, possible interaction effects among alexithymia, gender, and emotion were examined by conducting a 2 (Alexithymia) x 2 (Gender) x 7 (Emotion) repeated measures ANOVA with alexithymia as a between-subjects factor, and gender of the models and emotions depicted by the slides as within-subject factors. The suggested TAS-20 cutoff score of 61 (Bagby, Taylor, & Parker, 1994) was used to categorize participants by level of alexithymia.

**Ratings of Intensity of Emotions.**

Intensity ratings were calculated by measuring, in centimetres, the point at which participants marked the VAS (a 10 cm line) for each of the 14 slides. As participants were allowed to select any number of emotions, there were, in some cases, several intensity
ratings for each slide. A mean intensity rating was calculated for each slide, for each participant, resulting in 14 mean scores for each of the 90 participants.

Again, data reduction techniques were considered, and a 2 (Alexithymia) x 2 (Gender) x 7 (Emotion) repeated measures ANOVA was conducted to check for interaction effects among levels of alexithymia, emotion, or gender of model.

**Projected Behavioural Reactions.**

Participants' reported behavioural reactions to the modeled emotions were scored by a trained research assistant, according to whether they were considered avoidant or approach responses. Behaviours deemed avoidant were coded as 3, approach behaviours as 1, and neutral behaviours (i.e., not considered as representing either an avoidant or an approach behaviour) were coded 2. Scores can be considered to represent a type of “avoidance hierarchy,” with higher numbers describing a more avoidant behavioural style. A random sample of 40 responses was checked by a second rater, and there were zero disagreements. None of the participants indicated more than one behavioural response, thus there were 14 scores for each participant.

A 2 (Alexithymia) x 2 (Gender) x 7 (Emotion) repeated measures ANOVA was conducted to examine whether the pattern of scores revealed interaction effects among level of alexithymia and the dependent variables.

**Projected Emotional Reactions.**

Participants' reported emotional reactions were assessed, and scored in three different ways. First, they were scored on the basis of a match between (a) the posed affective state shown on the slides, and (b) the affective state chosen as the participant’s
emotional reaction. A scoring system was adopted similar to the system used to calculate accuracy scores for identifying the emotions portrayed on the slides. Thus, an index of accuracy was once again calculated. As before, a value of 1 was awarded for each perfect match, and each response represented either a “match” or a “miss.” Accuracy scores for each slide ranged from 0-1. For example, if “Happiness” was reported as the emotional reaction to a slide depicting “Happiness,” a score of 1 was awarded for a match. If, however, “Anger” were selected, a score of zero was awarded for a miss. Because participants were free to select any number of emotions as their predicted affective reaction(s), emotional reaction scores were modified by the total number of responses provided for each slide. A score of 1 was awarded for a perfect score, a score of .5 represented one match and one miss, a score of .25 represented one match and three misses, and so forth. Scores of zero were given when the correct emotion was not matched, regardless of the number of responses. Thus each participant’s possible range of scores, summed across all 14 slides, was 0 - 14.

Participants’ emotional reactions were also scored in a second way. Participants were awarded a “congruence” score according to the extent to which their responses were judged by a trained research assistant to be appropriate emotional reactions. If “Fear,” for example, was reported as an emotional response to a slide depicting “Anger,” this represents an appropriate emotional response. Congruency, or appropriateness, was decided according the following rules:

1. All responses representing indifference or curiosity were considered appropriate.
2. Responses indicating pleasure were considered appropriate for the “Happiness” slide.
3. Sad responses, and also “Pain,” and “Contempt” were considered appropriate reactions for the “Sadness” slide.

4. Negative responses, including “Pain,” “Disgust,” “Contempt,” “Sad,” “Anger,” “Fear,” as well as a “Surprise” response were appropriate for the “Contempt,” “Disgust,” “Anger,” and “Fear” slides.

5. “Happy,” was appropriate for the “Surprise” slide.

A score of 1 was awarded if there was at least one congruent emotion. To account for incongruency, the scores were modified by the number of incongruent emotions reported. For example, if “Pain” and “Curiosity” were selected for the “Anger” slide, a perfect score of 1 was earned. However, if “Happiness” was also selected, the score would be .5, and if “Pain,” “Curiosity,” “Happiness,” and “Boredom” were chosen, the perfect score of 1 (for “Pain” and “Curiosity”) would be modified by the 2 incongruent choices, resulting in a score of .3 (1 divided by 3). All scores were checked by a second trained rater, and where disagreements occurred, they were resolved by discussion.

To test the possibility that their reported emotional responses matched their ratings of the facial expressions, participants’ emotional reactions were also scored in a third way. Accuracy scores were calculated on the basis of congruence between participants’ ratings of posed emotional states (their percepts), and their projected emotional responses. The scoring system was adapted from the same general method already described: i.e., emotional responses were scored on the basis of a match between the participants’ percepts and the affective state chosen as their emotional reaction.
Again, patterns of scores were examined with a 2 (Alexithymia) x 2 (Gender) x 7 (Emotions) ANOVA to investigate the possibility of collapsing participants’ scores across emotion or gender.

**Study 2: Infant Expressions of Pain**

To calculate participants’ ratings of the sensory intensity and affective distress for neonate facial expressions of pain, the verbal descriptor scale scores provided by Gracely et al., (1979) were adopted. Mean scores for intensity and for distress were calculated separately across the 24 infant videos, resulting in two mean scores for each participant -- one representing sensory intensity and one representing affective distress.

Interviews were transcribed. The typed transcripts were then independently coded by 2 trained research assistants for sensory, affective, and miscellaneous other content. Training was accomplished by rating practice tapes until acceptable levels of agreement (r) were reached. Each occurrence of a phrase referring to physical pain, discomfort, medical procedure, or a physical process or strategy, was counted as “sensory,” and awarded one mark. Following are examples of what would constitute exemplars of the sensory category: references to soreness, needles, crying, telling the child not to look, or not to cry. Each occurrence of a phrase referring to an emotional effect or strategy was considered “affective,” and awarded a mark. Following are examples of affective exemplars: references to fear, emotional distress (but not crying), comforting the child, telling the child they were brave, or that mother was proud of them. Statements that were unable to be included either as “sensory” or “affective” material, were coded as “other,” and also warranted a mark for
each. All marks were tallied in each category, resulting in a total score for each participant for each of the 3 categories. Interrater reliability scores (r) were calculated.

**Study 3: Evaluation of Own Pain Experience**

To calculate participants' subjective ratings of sensory intensity and affective distress for their own pain experiences, the verbal descriptor scale scores provided by Gracely et al., (1979) were adopted. Thus each participant had one score for intensity and one for distress.

From responses on the pain questionnaires, the number of days was calculated since their pain stopped. For those participants still experiencing pain, that number was, of course, zero.

Interviews were transcribed. The typed transcripts were then coded by 2 trained research assistants for sensory, affective, and miscellaneous other content. Training was accomplished by rating practice tapes until acceptable levels of agreement (r) were reached. Each occurrence of a phrase referring to a physical pain, symptom or physical disability, a medical or physical strategy, or a physical (i.e., non-affective and non-interpersonal) effect of pain, was counted as "sensory," and awarded one mark. Following are examples of what would constitute exemplars of the "sensory" category: references to headache, bruise, inability to walk, wearing a cast, taking pills, inability to attend classes. Each occurrence of a phrase referring to an emotional or interpersonal effect or strategy was considered "affective," and awarded a mark. Following are "affective" exemplars: references to unhappiness or frustration, becoming angry with others, inability to attend parties, using relaxation, obtaining support from others. Statements that were unable to be included either as "sensory" or "affective" material, were coded as "other," and also warranted a mark for
each. All marks were tallied in each category, resulting in a total score for each participant for each of the 3 categories. Pearson’s $r$ was calculated to obtain an interrater reliability coefficient.
Results

It will be recalled that participants were expected to differ on dependent variables according to their TAS-20 scores. After controlling for confounding variables, high scorers ("alexithymics") were expected to be atypical judges of facially expressed emotion, and to assess pain as containing a higher sensory but lower affective component than low scorers ("non-alexithymics"). In particular, high-scorers were expected be inaccurate raters of emotions, and to rate emotion as low intensity. Their reported responses (emotional and behavioural) were expected to show incongruence and avoidance. After controlling for confounding variables, high-scorers were expected to conceptualize infant and child pain as high in sensory intensity but low in affective distress, and their own pain rating was expected to display this same sensory/affective distortion, relative to low-scorers.

For clarity, the detailed results are presented separately, in five parts. Initially, descriptive data of participant variables are outlined, followed by factor analysis data on the TAS-20. The final three sections are devoted to presentation of the statistical results for Studies 1, 2, and 3.

Descriptive Data for Participant Variables

The total n of 90 cannot be considered as representative of the student population of interest, because selection was ultimately biased in favour of students with high TAS-20 scores. It was felt, therefore, that the clearest way to present participant variables was in three tables. Table 1(a) presents descriptive data for participants 1-70 (before the later volunteers were screened for high alexithymia levels to boost the sample). Table 1(b) contains the same data, but only for volunteers 71-90, who were recruited later, and
Table 1(a)

**Descriptive Data for Participants 1 - 70**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Stand.Dev.</th>
<th>Range of Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS-20 Total</td>
<td>46.33</td>
<td>11.77</td>
<td>24 - 68</td>
</tr>
<tr>
<td>Age</td>
<td>22.75</td>
<td>6.58</td>
<td>17 - 53</td>
</tr>
<tr>
<td>*Level of Caregiving</td>
<td>3.25</td>
<td>1.19</td>
<td>1 - 5</td>
</tr>
<tr>
<td>BDI Score</td>
<td>9.16</td>
<td>6.73</td>
<td>0 - 32</td>
</tr>
<tr>
<td>**Modified BDI Score</td>
<td>5.41</td>
<td>4.62</td>
<td>0 - 21</td>
</tr>
<tr>
<td>***BDI Somatic Items</td>
<td>3.74</td>
<td>2.95</td>
<td>0 - 12</td>
</tr>
<tr>
<td>Verbal Fluency Score</td>
<td>38.87</td>
<td>10.64</td>
<td>18 - 68</td>
</tr>
</tbody>
</table>

Table 1(b)

**Descriptive Data for Participants 71 - 90**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Stand.Dev.</th>
<th>Range of Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS-20 Total</td>
<td>64.70</td>
<td>7.58</td>
<td>45 - 75</td>
</tr>
<tr>
<td>Age</td>
<td>17.85</td>
<td>.67</td>
<td>17 - 19</td>
</tr>
<tr>
<td>*Level of Caregiving</td>
<td>3.30</td>
<td>1.13</td>
<td>1 - 5</td>
</tr>
<tr>
<td>BDI Score</td>
<td>12.40</td>
<td>9.87</td>
<td>1 - 31</td>
</tr>
<tr>
<td>**Modified BDI Score</td>
<td>8.15</td>
<td>6.71</td>
<td>0 - 21</td>
</tr>
<tr>
<td>***BDI Somatic Items</td>
<td>4.25</td>
<td>3.55</td>
<td>0 - 14</td>
</tr>
<tr>
<td>Verbal Fluency Score</td>
<td>34.95</td>
<td>7.13</td>
<td>23 - 47</td>
</tr>
</tbody>
</table>
### Table 1(c)

**Descriptive Data for Participants 1 - 90**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Stand.Dev.</th>
<th>Range of Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS-20 Total</td>
<td>50.41</td>
<td>13.36</td>
<td>24 - 75</td>
</tr>
<tr>
<td>Age</td>
<td>21.65</td>
<td>6.14</td>
<td>17 - 53</td>
</tr>
<tr>
<td>*Level of Caregiving</td>
<td>3.26</td>
<td>1.17</td>
<td>1 - 5</td>
</tr>
<tr>
<td>BDI Score</td>
<td>9.88</td>
<td>7.60</td>
<td>0 - 32</td>
</tr>
<tr>
<td><strong>Modified BDI Score</strong></td>
<td>6.02</td>
<td>5.24</td>
<td>0 - 21</td>
</tr>
<tr>
<td>*<strong>BDI Somatic Items</strong></td>
<td>3.86</td>
<td>3.08</td>
<td>0 - 14</td>
</tr>
<tr>
<td>Verbal Fluency Score</td>
<td>38.00</td>
<td>10.06</td>
<td>18 - 68</td>
</tr>
</tbody>
</table>

*From 1 - 5; **Items 1-13 only; ***Items 14-20 only.*
screened for TAS-20 scores. Table 1(c) presents descriptive data for the entire sample of 90. Not surprisingly, the data in Table (b) reflect higher mean scores on the TAS-20 and all its factors, as well as higher depressed mood scores.

TAS-20 total scores in Table 1(a) are similar to those collected elsewhere. For example, Bagby et al., (1992) reported TAS-20 mean scores of 47.4 (SD = 11.0) and 54.5 (SD = 13.5) in female university students and psychiatric outpatient groups, respectively.

**Factor Analysis of the TAS-20**

Principal-components and maximum-likelihood analyses were performed on TAS-20 scores collected on a total sample of 145 student volunteers. SSPS for Windows was used for statistical analyses. Before factor extraction, the 20 x 20 correlation matrix was assessed with the Kaiser-Meyer-Olkin measure of sampling adequacy, resulting in a measure of .82. Values in this range indicate that the matrix was appropriate for factor analysis (Kaiser, 1970). As expected, Bartlett’s test of sphericity indicated that the matrix differed significantly from an identity matrix (p < .0001). When no *a priori* specification as to the number of factors was imposed, an eigen decomposition of the 20 x 20 correlation matrix produced five factors greater than one. In order to decide how many factors to retain for rotation, the following information was considered: (a) the scree plot indicated a discernible break between 4 and 5, (b) the eigenvalues greater than 1 rule (Cattell, 1966) suggested 5 factors; and (c) the likelihood ratio test suggested 5 factors. The scree plot is presented as

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*Kaiser (1970) characterizes measures in the .90’s as marvelous, in the .80’s as meritorious, in the .70’s as middling, in the .60’s as mediocre, in the .50’s as miserable, and below 0.5 as unacceptable.*
Figure 1

TAS-20 Factor Scree Plot
Figure 1. Considering ease of interpretability and a desire to avoid overfactoring, the decision was made to retain a maximum-likelihood, 4-factor solution.

When running the Oblimin oblique rotation on SSPS for Windows, a delta value of zero proved best in terms of optimum number of hyperplanes and complex items. The results of the 4 factor solution, together with internal consistency coefficients, are presented in Table 2, with variables grouped by size of loading to facilitate interpretation. Reverse scored items are indicated by asterisks. As shown in the table, two items were dropped because they failed to load on any factors, using a cutoff criterion of .30. Factor 1, which accounted for 10.1% of the variance, consists of items that refer to difficulty identifying bodily sensations (e.g., “I have physical sensations that even doctors don’t understand”), and confirms a factor found in previous factor analyses of the TAS-20 and early versions of the TAS. Factor 2, representing 22.0% of the variance, reflects confusion about emotions (e.g., “I am often confused about what emotion I am feeling”), also a factor which has a robust history in previous analyses. Factor 3, accounting for 4.9% of the variance, consists of items that refer to an external cognitive style (e.g., “Looking for hidden meaning in movies or plays distracts from their enjoyment”), another factor found in previous TAS analyses. Factor 4, which accounted for 3.4% of the variance, seems to represent discomfort and awkwardness in interpersonal situations involving emotions (e.g., “It is difficult for me to reveal my innermost feelings, even to close friends”). In total, 40.4% of the variance was accounted for by the 4 factors.

Having obtained 4 “clean” factors, subscales were formed by unit weighting the items. The internal consistency coefficients (Cronbach’s alpha) for factors 1 to 4 were. 70,
Table 2

Oblique Factor Solution for the TAS-20 with \((n=145)\) Female Undergraduate Students who have Experienced Non-Acute Pain in the Past Year

<table>
<thead>
<tr>
<th>TAS-20 Item</th>
<th>Primary</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1 ((\sigma = .70))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have physical sensations that even doctors don’t understand.</td>
<td></td>
<td>.98</td>
<td>.02</td>
<td>.14</td>
<td>.06</td>
</tr>
<tr>
<td>I am often puzzled by sensations in my body</td>
<td></td>
<td>.41</td>
<td>.38</td>
<td>-.02</td>
<td>-.02</td>
</tr>
<tr>
<td>Factor 2 ((\sigma = .84))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am often confused about what emotion I am feeling.</td>
<td>-.03</td>
<td>.70</td>
<td>.13</td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>I often don’t know why I am angry.</td>
<td>.00</td>
<td>.66</td>
<td>-.03</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>I have feelings that I can’t quite identify.</td>
<td>.11</td>
<td>.64</td>
<td>.05</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td>I don’t know what’s going on inside me.</td>
<td>.03</td>
<td>.62</td>
<td>-.05</td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>It is difficult for me to find the right words for my feelings.</td>
<td>.02</td>
<td>.42</td>
<td>.17</td>
<td>.38</td>
<td></td>
</tr>
<tr>
<td>When I am upset, I don’t know if I am sad, frightened, or angry.</td>
<td>.09</td>
<td>.42</td>
<td>-.06</td>
<td>.33</td>
<td></td>
</tr>
<tr>
<td>Factor 3 ((\sigma = .61))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*I find examination of my feelings useful in solving personal problems.</td>
<td>-.01</td>
<td>-.14</td>
<td>.64</td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>*Being in touch with emotions is essential.</td>
<td>.01</td>
<td>.13</td>
<td>.51</td>
<td>-.05</td>
<td></td>
</tr>
<tr>
<td>Looking for hidden meaning in movies or plays distracts from their enjoyment.</td>
<td>.11</td>
<td>-.06</td>
<td>.42</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td>I prefer to watch “light” entertainment shows rather than psychological dramas.</td>
<td>-.26</td>
<td>.21</td>
<td>.35</td>
<td>.03</td>
<td></td>
</tr>
</tbody>
</table>
Table 2, continued

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>*I can feel close to someone, even in moments of silence.</td>
<td>-.04</td>
<td>.12</td>
<td>.35</td>
<td>.13</td>
</tr>
<tr>
<td><strong>Factor 4 (σ = .73)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is difficult for me to reveal my innermost feelings, even to close friends.</td>
<td>-.03</td>
<td>.04</td>
<td>.12</td>
<td>.64</td>
</tr>
<tr>
<td>I find it hard to describe how I feel about people.</td>
<td>-.12</td>
<td>.28</td>
<td>.10</td>
<td>.53</td>
</tr>
<tr>
<td>People tell me to describe my feelings more.</td>
<td>.04</td>
<td>.10</td>
<td>-.09</td>
<td>.51</td>
</tr>
<tr>
<td>*I am able to describe my feelings easily.</td>
<td>.12</td>
<td>.30</td>
<td>.25</td>
<td>.43</td>
</tr>
<tr>
<td>I prefer talking to people about daily activities rather than their feelings.</td>
<td>-.07</td>
<td>-.05</td>
<td>.32</td>
<td>.34</td>
</tr>
<tr>
<td><strong>Items deleted because they failed to load on any factor:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I prefer to just let things happen rather than to understand why they turned out that way.</td>
<td>.08</td>
<td>.06</td>
<td>-.01</td>
<td>.24</td>
</tr>
<tr>
<td>*I prefer to analyze problems rather than just describe them.</td>
<td>.01</td>
<td>.05</td>
<td>.17</td>
<td>-.10</td>
</tr>
</tbody>
</table>

*Items reverse scored

Factor 1: Difficulty Identifying Bodily Sensations
Factor 2: Confusion About Emotions
Factor 3: External Cognitive Style
Factor 4: Interpersonal Awkwardness
Table 3

Descriptive Data for TAS-20 Scores
Participants 1 - 145

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Stand.Dev.</th>
<th>Range of Scores</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS-20 Total Scores</td>
<td>49.50</td>
<td>12.25</td>
<td>23-75</td>
<td>.01</td>
</tr>
<tr>
<td>Factor 1: Body</td>
<td>5.12</td>
<td>2.20</td>
<td>2 - 10</td>
<td>.24</td>
</tr>
<tr>
<td>Factor 2: Emotions</td>
<td>16.73</td>
<td>5.64</td>
<td>6 - 28</td>
<td>.00</td>
</tr>
<tr>
<td>Factor 3: External</td>
<td>10.38</td>
<td>3.35</td>
<td>5 - 20</td>
<td>.35</td>
</tr>
<tr>
<td>Factor 4: Awkward</td>
<td>13.05</td>
<td>4.29</td>
<td>5 - 23</td>
<td>.13</td>
</tr>
</tbody>
</table>
.84, .61, and .73 respectively. Considering the size of the subscales, these coefficients reflect adequate internal consistency. Overall, the internal consistency value was $\alpha = .85$. Table 3 shows descriptive data for TAS-20 scores for all 145 participants.

The pattern of factor intercorrelations, shown as Table 4, suggest that the factors do represent, for the most part, interdependent dimensions of responding (i.e., that they are not orthogonal), and that oblique rotation is therefore appropriate. The correlations are not high enough, however, to suggest that the TAS-20 assesses a unidimensional construct, or that any of the factors should be collapsed. Table 5 presents the correlations of TAS-20 total and factor scores with the variables: verbal fluency, extent of caregiving experience, and depressed mood, and Figures 2-6 show the distributions of scores for TAS-20 total and factor scores.

**Study 1: Facial Expressions of Emotion**

**Slide Accuracy and Intensity**

Having arrived at a four-factor model of alexithymia, associations between these factors and the dependent variables in Study 1 were then examined, starting with participants’ accuracy scores and intensity ratings from their assessments of slides depicting posed emotional expressions. For accuracy scores, the repeated measures ANOVA revealed significant main effects for alexithymia and for emotion, but no two-way interactions involving alexithymia, and no three-way interaction (alexithymia x gender x emotion). These results are shown as Table 6. Since the ns were unequal (26 participants in the high-alexithymia group, and 64 in the low-alexithymia group), Box’s test was used to evaluate
Figure 2
Distribution of TAS-20 Total Scores

TAS-20 total scores

Std. Dev = 12.25
Mean = 49.5
N = 145.00
Figure 3
TAS-20 Factor 1 Scores:

Confusion about Bodily Sensations (Body)

TAS-20 Factor 1 Scores
Figure 4
TAS-20 Factor 2 Scores:
Confusion about Emotions (Emotions)

Std. Dev = 5.64
Mean = 16.7
N = 145.00
Figure 5
TAS-20 Factor 3 Scores:
External Cognitive Style (External)

Std. Dev = 3.35
Mean = 10.4
N = 145.00
Figure 6
TAS-20 Factor 4 Scores:
Interpersonal Awkwardness (Awkward)

TAS-20 Factor 4 scores

Std. Dev = 4.28
Mean = 13.1
N = 145.00
### Table 4

**TAS-20 Factor Intercorrelations**

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 2</td>
<td>.27</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 3</td>
<td>-.05</td>
<td>.33</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Factor 4</td>
<td>.09</td>
<td>.41</td>
<td>.24</td>
<td>1.00</td>
</tr>
</tbody>
</table>
### Table 5(a)
#### Correlations between TAS-20 Scores and other Participant Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of Caregiving (1-5)</th>
<th>Verbal Fluency Scores</th>
<th>BDI Total Scores</th>
<th>Modified BDI Scores</th>
<th>BDI Somatic Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS-20 Total</td>
<td>-.16</td>
<td>-.11</td>
<td>.59***</td>
<td>.60***</td>
<td>.40**</td>
</tr>
<tr>
<td>Factor 1: Body</td>
<td>.02</td>
<td>-.01</td>
<td>.49***</td>
<td>.48***</td>
<td>.36**</td>
</tr>
<tr>
<td>Factor 2: Emotions</td>
<td>-.12</td>
<td>-.10</td>
<td>.60***</td>
<td>.62***</td>
<td>.40**</td>
</tr>
<tr>
<td>Factor 3: External</td>
<td>-.16</td>
<td>-.18</td>
<td>.33**</td>
<td>.32**</td>
<td>.18</td>
</tr>
<tr>
<td>Factor 4: Awkward</td>
<td>-.16</td>
<td>.01</td>
<td>.36**</td>
<td>.36**</td>
<td>.26*</td>
</tr>
</tbody>
</table>

### Table 5(b)
#### Correlations between TAS-20 Scores and other Participant Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of Caregiving (1-5)</th>
<th>Verbal Fluency Scores</th>
<th>BDI Total Scores</th>
<th>Modified BDI Scores</th>
<th>BDI Somatic Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS-20 Total</td>
<td>-.45*</td>
<td>-.34</td>
<td>.38</td>
<td>.38</td>
<td>.33</td>
</tr>
<tr>
<td>Factor 1: Body</td>
<td>-.21</td>
<td>.08</td>
<td>.01</td>
<td>-.01</td>
<td>.05</td>
</tr>
<tr>
<td>Factor 2: Emotions</td>
<td>-.35</td>
<td>-.38</td>
<td>.40</td>
<td>.40</td>
<td>.35</td>
</tr>
<tr>
<td>Factor 3: External</td>
<td>-.19</td>
<td>.02</td>
<td>-.01</td>
<td>-.02</td>
<td>.01</td>
</tr>
<tr>
<td>Factor 4: Awkward</td>
<td>-.26</td>
<td>-.35</td>
<td>.49*</td>
<td>.51*</td>
<td>.39</td>
</tr>
</tbody>
</table>

### Table 5(c)
#### Correlations between TAS-20 Scores and other Participant Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of Caregiving (1-5)</th>
<th>Verbal Fluency Scores</th>
<th>BDI Total Scores</th>
<th>Modified BDI Scores</th>
<th>BDI Somatic Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS-20 Total</td>
<td>-.15</td>
<td>-.20</td>
<td>.52***</td>
<td>.55***</td>
<td>.34**</td>
</tr>
<tr>
<td>Factor 1: Body</td>
<td>-.02</td>
<td>-.04</td>
<td>.38***</td>
<td>.38***</td>
<td>.29**</td>
</tr>
<tr>
<td>Factor 2: Emotions</td>
<td>-.12</td>
<td>-.20</td>
<td>.54***</td>
<td>.57***</td>
<td>.36***</td>
</tr>
<tr>
<td>Factor 3: External</td>
<td>-.14</td>
<td>-.20</td>
<td>.27*</td>
<td>.31**</td>
<td>.14</td>
</tr>
<tr>
<td>Factor 4: Awkward</td>
<td>-.15</td>
<td>-.11</td>
<td>.40***</td>
<td>.42***</td>
<td>.28**</td>
</tr>
</tbody>
</table>

* E < .05  ** E < .01  *** E < .001
Table 6

2 x 2 x 7 Repeated Measures ANOVA Table for Accuracy Scores Calculated from Participants' Ratings of Slides Depicting Posed Emotional Expressions (n = 90)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>BETWEEN SUBJECTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alexithymia</td>
<td>1.40</td>
<td>1</td>
<td>1.40</td>
<td>4.31</td>
<td>.041*</td>
</tr>
<tr>
<td>WITHIN SUBJECTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Cells Error</td>
<td>55.53</td>
<td>528</td>
<td>.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>28.22</td>
<td>6</td>
<td>4.70</td>
<td>44.73</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>Gender</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.01</td>
<td>.919</td>
</tr>
<tr>
<td>Alexithymia x Emotion</td>
<td>.35</td>
<td>6</td>
<td>.06</td>
<td>.55</td>
<td>.769</td>
</tr>
<tr>
<td>Alexithymia x Gender</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.00</td>
<td>.999</td>
</tr>
<tr>
<td>Emotion x Gender</td>
<td>2.17</td>
<td>6</td>
<td>.36</td>
<td>4.44</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>Alexithymia x Emotion x Gender</td>
<td>.52</td>
<td>6</td>
<td>.09</td>
<td>1.06</td>
<td>.389</td>
</tr>
</tbody>
</table>

Note: Epsilons: Greenhouse-Geisser = .8424
Lower-bound (1/K-1) = .1667
heterogeneity of variance. The \textit{M} statistic of 163.40 was not significant (N \textsubscript{2} (105), = 128.41; \( p = .060 \)), failing to disconfirm the null hypothesis of homogeneity of variance between cells. Presence of non-sphericity was found for the within-subjects factor -- emotion (Mauchley's \( W = .612; \ p = .003 \)) but mean differences remained significant even at the conservative lower-bound adjusted degrees of freedom. The significant two-way interaction between emotion and gender dictates that the significance of emotion type must be interpreted within the context of the gender of the model. These results suggest that while level of alexithymia is a significant factor for overall accuracy, it is not involved in accuracy differences based on the interaction of emotional expression and gender of the model. Since there were no significant interactions involving the between-subject factor, the decision was made to sum each participant's scores across slides rather than analyzing emotions separately, or discriminating on the basis of gender. This resulted in a possible summed accuracy score range of 0 - 14 for each participant. The overall mean, standard deviation, and skewness were calculated (\( M = 7.7; \ SD = 2.17; \) skewness = .02), and scores ranged from 1.3 to 14.

When these summed accuracy scores were correlated with the TAS-20 and its factors, there was a significant negative association between accuracy scores and Factor 1 (Body) (\( r = -.29, \ p = .006 \)), accuracy scores and Factor 2 (Emotion) (\( r = -.41, \ p < .001 \)), as well as between accuracy scores and TAS-20 total scores (\( r = -.35, \ p = .001 \)).

Previous research has found that low mood affects ability to judge others' emotions (Persad & Polivy, 1993), and also that alexithymia is strongly related to depression. It was
necessary to determine whether the association between alexithymia and accuracy in identifying slides was more than an artifact of their shared association with negative affect. The non-somatic component of depression was controlled by conducting a Pearson’s partial correlation between accuracy scores and TAS-20 scores, controlling for scores on the modified version of the BDI. Removing shared variance with depressed mood did reduce the size (but not the direction) of the coefficients, but there remained a significant negative correlation between accuracy scores and the TAS-20 Emotion factor \( (r = -.22, \ p = .041) \). Correlations with the other three TAS-20 factors and with the TAS-20 total were all negative, but nonsignificant. There was no significant relationship \( (r = .13; \ p = .221) \) between word fluency and accuracy scores, and thus there was no need to control for this variable.

The relationship between alexithymia and participants’ evaluations of the intensity of the modeled emotions (represented by a visual analogue score out of 10) was next examined. Once again, results of a 2 x 2 x 7 repeated measures ANOVA ruled out the presence of significant two or three way interactions involving alexithymia and the within-subject factors (emotion and gender of model), and so mean intensity scores for each participant were computed across all 14 slides. The overall mean, standard deviation, and skewness were calculated \( (M = 6.70; \ SD = 1.04; \ skewness = -.03) \), and scores ranged from 3.48 - 9.69. Pearson’s correlations were performed, and the results revealed that intensity scores were statistically unrelated to the TAS-20 and its factors, both before and after partialling out shared variance with modified BDI scores. Table 7 presents the matrix of correlation coefficients between intensity scores and alexithymia scores.
Table 7

Correlations between TAS-20 Scores and Intensity Scores Calculated from Participants' Ratings of Slides Depicting Posed Emotional Expressions

(n = 90)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intensity Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS-20 Total Scores</td>
<td>( r = .000; p = .998 )</td>
</tr>
<tr>
<td>Factor 1: Body</td>
<td>( r = .069; p = .520 )</td>
</tr>
<tr>
<td>Factor 2: Emotions</td>
<td>( r = -.006; p = .960 )</td>
</tr>
<tr>
<td>Factor 3: External</td>
<td>( r = -.122; p = .254 )</td>
</tr>
<tr>
<td>Factor 4: Awkward</td>
<td>( r = .057; p = .590 )</td>
</tr>
</tbody>
</table>

Table 8

Correlations between TAS-20 Scores and Number of times “Pain” was selected as a Label for Slides Depicting Posed Emotional Expressions

(n = 90)

<table>
<thead>
<tr>
<th>Variable</th>
<th># “Pain” Choices (first order correlation)</th>
<th># “Pain” Choices (controlling for depressed mood)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS-20 Total Scores</td>
<td>.354**</td>
<td>.268*</td>
</tr>
<tr>
<td>Factor 1: Body</td>
<td>.354**</td>
<td>.316**</td>
</tr>
<tr>
<td>Factor 2: Emotions</td>
<td>.381***</td>
<td>.278**</td>
</tr>
<tr>
<td>Factor 3: External</td>
<td>.090</td>
<td>.017</td>
</tr>
<tr>
<td>Factor 4: Awkward</td>
<td>.286**</td>
<td>.207</td>
</tr>
</tbody>
</table>

* \( p < .05 \) 
** \( p < .01 \) 
*** \( p < .001 \)
It will be recalled that one of the choices given to participants was the label “Pain.”

The possibility of a relationship between alexithymia and a tendency to select this label instead of (or in addition to) an affective label was explored. The number of “Pain” choices was tallied for each participant, and when these totals were correlated with TAS-20 and factor scores, the results showed significant positive relationships with 3 of the factors: Body (r = .35; p < .01), Emotion (r = .38; p < .001), and Awkward (r = .29; p < .01), as well as with TAS-20 total scores (r = .35; p < .01). Correlations between “Pain” totals and alexithymia scores are presented as Table 8. No relationship was found between the tendency to choose this response and the extent of pain participants were currently experiencing (r = .08; p = .46), and thus it was not necessary to control for this variable. After removing shared variance with modified BDI scores, by performing partial correlations, the sizes of the coefficients were reduced, but all remained significant except for the association with the Awkward factor. Potentially, scores could range from 0 - 14; the actual range was 0 - 12, and the mean and standard deviation were 3.27 and 2.44, respectively. Skewness was 1.37.

**Behavioural and Emotional Responses**

Participants’ reported behavioural and emotional responses to the modeled emotions were investigated. Behavioural responses represent participants’ predictions of their probable behavioural responses to individuals bearing the same facial expressions displayed by the models seen in the slides. The behavioural responses were transformed to an “avoidance hierarchy” of 1 - 3, with higher scores representing more avoidant behaviours. A
2 x 2 x 7 repeated measures ANOVA was first conducted, to investigate the possibility of collapsing behavioural response scores across emotion or gender of model. Since there were no significant interactions involving alexithymia, a mean behavioural response score was calculated for each participant. The overall mean, standard deviation and skewness were calculated as 1.83, .281, and -.20, respectively. After correlating participants' mean scores with the TAS-20 and its factors, there was a significant positive correlation between behavioural response scores and one TAS-20 factor -- External $(r = .25; p = .017)$, but when the effect of modified BDI scores was partialled out by performing semi-partial Pearson's correlations, the coefficient was no longer significant $(r = .17; p = .107)$.

Next, participants' emotional response accuracy scores were examined. Emotional responses represent participants' predicted emotional responses to individuals bearing the facial expressions portrayed by the models in the slides, and accuracy scores represent the extent to which the emotional response matches the modeled emotion. When the summed emotional accuracy scores were correlated with alexithymia scores, significant negative correlations were obtained between the emotional accuracy scores and Emotion, Awkward, and TAS-20 total scores. The correlation matrix is presented as Table 9. After controlling for the effects of modified BDI scores by performing partial correlations, lower emotional response accuracy scores remained significantly associated with higher scores on TAS-20 total scores as well as Emotion. The overall mean, standard deviation and skewness were calculated as 3.94, 1.77, and .72, respectively. Scores, from a possible range of 0 - 14, actually ranged between .5 to 10.
### Table 9

**Correlations between TAS-20 Scores and Participants’ Emotional Response**

**Accuracy/Appropriateness Scores for Ratings of Slides Depicting Posed Emotional Expressions**

*(n = 90)*

<table>
<thead>
<tr>
<th>Scores</th>
<th>TAS-20 Total Scores</th>
<th>Factor 1: Body</th>
<th>Factor 2: Emotions</th>
<th>Factor 3: External</th>
<th>Factor 4: Awkward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Accuracy Scores</td>
<td>-.348*</td>
<td>.068</td>
<td>-.426***</td>
<td>-.203</td>
<td>-.268*</td>
</tr>
<tr>
<td>(first order correlations)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Accuracy Scores</td>
<td>-.232*</td>
<td>.050</td>
<td>-.326*</td>
<td>-.123</td>
<td>-.164</td>
</tr>
<tr>
<td>(controlling for depressed mood)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scores based on Appropriateness</td>
<td>-.401***</td>
<td>-.173</td>
<td>-.464***</td>
<td>-.089</td>
<td>-.331**</td>
</tr>
<tr>
<td>(first order correlations)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scores based on Appropriateness</td>
<td>-.361**</td>
<td>-.111</td>
<td>-.441***</td>
<td>-.033</td>
<td>-.281**</td>
</tr>
<tr>
<td>(controlling for depressed mood)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scores based on Percept Matches</td>
<td>-.202</td>
<td>.022</td>
<td>-.257*</td>
<td>-.115</td>
<td>-.180</td>
</tr>
<tr>
<td>(first order correlations)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scores based on Percept Matches</td>
<td>-.098</td>
<td>.115</td>
<td>-.160</td>
<td>-.052</td>
<td>-.097</td>
</tr>
<tr>
<td>(controlling for depressed mood)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* *p < .05  
** *p < .01  
*** *p < .001
Participants often reported emotional reactions that were congruent with the modeled emotions, though not identical. For example, “Fear” was reported as a response to the “Anger” face. Clearly, this could be considered an appropriate emotional response. When such appropriate responses were counted as accurate matches, summed, and correlated with alexithymia scores, negative relationships resulted between appropriate emotional responses and Emotion, Awkward, and TAS-20 total scores. Correlations are included in Table 9. Controlling for the effects of modified BDI scores by performing partial Pearson’s correlations affected the size, but not the direction, of the results. Lower appropriate emotional response scores remained significantly associated with higher scores on TAS-20 total scores as well as with higher scores on Emotion and Awkward.

To investigate the possibility that reported emotional reactions, while they may not match the posed emotion, may match participants’ own perception of the poses, responses were scored to reflect percept matches. When these percept matches were counted as accurate matches, summed, and correlated with alexithymia scores, a significant inverse relationship was found between percept matches and the Emotion factor. Correlations are included in Table 9. When partial correlations were performed to control for depressed mood, this result no longer reached significance.

**Study 2: Infant Expressions of Pain**

Participants rated infant pain, from videotapes of neonates, on the two dimensions of sensory intensity and emotional distress. Ratings were made using verbal descriptor scales (Gracely et al., 1978). Descriptive data on these variables appear in Table 10. Pearson’s correlations were performed with alexithymia scores and both mean sensory
Table 10

**Descriptive Data for Participants' Ratings of Infant Pain**

*(n = 90)*

<table>
<thead>
<tr>
<th>Scores</th>
<th>Mean</th>
<th>Stand.Dev.</th>
<th>Range of Scores</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory Intensity Ratings</td>
<td>20.87</td>
<td>8.75</td>
<td>2.32 - 49.26</td>
<td>.71</td>
</tr>
<tr>
<td>Emotional Distress Ratings</td>
<td>12.58</td>
<td>4.73</td>
<td>3.28 - 25.02</td>
<td>.44</td>
</tr>
</tbody>
</table>

Table 11

**Correlations between TAS-20 Scores and Participants' Ratings of Infant Pain**

*(n = 90)*

<table>
<thead>
<tr>
<th>Scores</th>
<th>TAS-20 Total Scores</th>
<th>Factor 1: Body</th>
<th>Factor 2: Emotions</th>
<th>Factor 3: External</th>
<th>Factor 4: Awkward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Sensory Intensity Ratings (first order correlations)</td>
<td></td>
<td>.101</td>
<td>.286**</td>
<td>.136</td>
<td>-.139</td>
</tr>
<tr>
<td>Mean Sensory Intensity Ratings (controlling for depressed mood)</td>
<td></td>
<td>.138</td>
<td>.320**</td>
<td>.185</td>
<td>-.138</td>
</tr>
<tr>
<td>Mean Sensory Intensity Ratings (controlling for depressed mood and current pain)</td>
<td></td>
<td>.104</td>
<td>.261*</td>
<td>.161</td>
<td>-.150</td>
</tr>
<tr>
<td>Mean Emotional Distress Ratings (first order correlations)</td>
<td></td>
<td>-.029</td>
<td>.253*</td>
<td>.021</td>
<td>-.230*</td>
</tr>
<tr>
<td>Mean Emotional Distress Ratings (controlling for depressed mood)</td>
<td></td>
<td>.005</td>
<td>.298**</td>
<td>.067</td>
<td>-.222*</td>
</tr>
<tr>
<td>Mean Emotional Distress Ratings (controlling for depressed mood and current pain)</td>
<td></td>
<td>-.035</td>
<td>.234*</td>
<td>.039</td>
<td>-.240*</td>
</tr>
</tbody>
</table>

* p < .05
** p < .01
intensity ratings, and mean emotional distress ratings. Correlation matrices are shown in Table 11. As shown, mean sensory ratings bore a positive relationship to Factor 1 (Body) scores. Contrary to expectations, mean emotional distress ratings showed a similar pattern with regard to Body factor scores (positively related). They were negatively correlated with External factor scores. After controlling for negative mood by partialling out modified BDI scores, results for sensory intensity ratings remained statistically significant, as did correlations involving emotional distress scores. Scores reflecting participants' current levels of pain were found to be associated with their judgement of infant videos (current pain and mean emotional distress: $r = .24, p = .027$; current pain and sensory intensity: $r = .23, p = .030$); consequently, the influence of current pain was removed by calculating residualized scores for both emotional distress and sensory intensity ratings. Partial Pearson’s correlations were then performed between alexithymia scores and these residuals, controlling for modified BDI scores (i.e., non-somatic negative mood was partialled out of both sets of variables, and the influence of current pain was removed from the dependent variables). These calculations resulted in significant positive relationships between Factor 1 (Body) and ratings of both affective distress ($r = .23, p = .030$), and sensory intensity ($r = .26; p = .014$), suggesting that these relationships are independent of the contributions of depression and the effect of being in pain. Results also show a significant negative correlation between affective distress scores and External factor scores ($r = -.24; p = .025$).

**Interview Results.**
No relationship was found between the TAS-20 or its factors and indices of sensory or affective content of participant interviews. Interrater reliability, using Pearson’s r, was calculated at between .84 and .99 for all ratings.

**Study 3: Evaluation of Own Pain Experience**

Participants rated their own pain experiences on two dimensions: sensory intensity and emotional distress. Descriptive data on these variables appear in Table 12. Pearson’s correlations were performed between alexithymia scores and mean sensory intensity ratings, and between alexithymia and mean emotional distress ratings. The correlation coefficients are shown in Table 13. As shown, mean sensory scores were statistically unrelated to alexithymia scores from the TAS-20 or its factors. Mean emotional distress ratings, however, were positively related to all alexithymia scores except those for Factor 3 — External. After controlling for negative mood by partialling out modified BDI scores, the results relating to emotional distress scores were still positively related to Factors 1 and 4 (Body and Awkward), and also to TAS-20 total scores. The relationship between emotional distress scores and Emotions was still positive, but non-significant (p = .073).

Scores reflecting participants’ current levels of pain were found to be associated with ratings of their own levels of emotional distress (r = .31, p = .003), so the influence of current pain was removed by calculating residualized scores for emotional distress rating scores. Partial Pearson’s correlations were then performed between alexithymia scores and these residuals, controlling for modified BDI scores (i.e., non-somatic negative mood was partialled out of both sets of variables, and the influence of current pain was removed from the dependent variables). These calculations resulted in a positive relationship between
Table 12

**Descriptive Data for Participants' Ratings of their own Pain Experience**

*(n = 90)*

<table>
<thead>
<tr>
<th>Scores</th>
<th>Mean</th>
<th>Stand.Dev.</th>
<th>Range of Scores</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory Intensity Ratings</td>
<td>39.54</td>
<td>12.58</td>
<td>5.5 - 59.5</td>
<td>-.06</td>
</tr>
<tr>
<td>Emotional Distress Ratings</td>
<td>15.97</td>
<td>10.74</td>
<td>2.80 - 44.8</td>
<td>1.42</td>
</tr>
</tbody>
</table>

Table 13

**Correlations between TAS-20 Scores and Participants' Ratings of their own Pain Experience**

*(n = 90)*

<table>
<thead>
<tr>
<th>Scores</th>
<th>TAS-20 Total Scores</th>
<th>Factor 1: Body</th>
<th>Factor 2: Emotions</th>
<th>Factor 3: External</th>
<th>Factor 4: Awkward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Sensory Intensity Ratings (first order correlations)</td>
<td>-.027</td>
<td>.069</td>
<td>.007</td>
<td>-.188</td>
<td>.015</td>
</tr>
<tr>
<td>Mean Sensory Intensity Ratings (controlling for depressed mood)</td>
<td>.050</td>
<td>.127</td>
<td>.097</td>
<td>-.158</td>
<td>.076</td>
</tr>
<tr>
<td>Mean Sensory Intensity Ratings (controlling for depressed mood and current pain)</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Mean Emotional Distress Ratings (first order correlations)</td>
<td>.268*</td>
<td>.282**</td>
<td>.226*</td>
<td>.098</td>
<td>.271*</td>
</tr>
<tr>
<td>Mean Emotional Distress Ratings (controlling for depressed mood)</td>
<td>.242*</td>
<td>.256*</td>
<td>.192</td>
<td>.065</td>
<td>.244*</td>
</tr>
<tr>
<td>Mean Emotional Distress Ratings (controlling for depressed mood and current pain)</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>.215*</td>
</tr>
</tbody>
</table>

*p < .05

**p < .01**
Awkward factor scores and emotional distress ($r = .22, p = .044$), suggesting that this relationship exists independently of contributions of mood and the effect of being in pain.

**Interview Results**

No relationship was found between the TAS-20 or its factors and indices of sensory or affective content of participant interviews.
Discussion

The purpose of this series of studies was to explore the alexithymia construct and its relationship to several of its core areas of functioning. The first step was to measure alexithymia and check the factor structure of the TAS-20 for the sample. The overall pattern of results confirmed that, as others have found (e.g., Haviland & Reise, 1996; Hendryx et al., 1992), alexithymia is not a unidimensional construct, but is best conceptualized and assessed as multifactorial. The findings are consistent with the proposition that there is fundamental integrity to the construct of alexithymia although some of its constituent dimensions are relatively independent. As Taylor et al., (1997) concluded, alexithymia is “a multifaceted construct composed of several logically related subordinate concepts” (p.29).

It is generally agreed, with the introduction and validation of the Toronto Alexithymia Scale, that Bagby and his colleagues have precipitated a flurry of experimental interest in alexithymia by providing researchers with a psychometrically sound measurement instrument. Since its inception in 1985, the TAS and its revisions have been subjected to many data reduction techniques, with differing results. Alexithymia, as measured by the TAS, has been conceptualized as consisting of 2, 3, 4, and 5 factors, including: difficulty identifying feelings and distinguishing them from bodily sensations, difficulty describing feelings, externally oriented thinking (Bagby, Parker, & Taylor, 1994); emotional understanding deficit, importance of emotion (Kroner & Forth, 1995); emotional awareness deficit (Haviland & Reise, 1996); reduced daydreaming (Taylor, Ryan & Bagby, 1985); difficulty expressing feelings to others (Kirmayer & Robbins, 1993); lack of introspection, social conformity (Bagby, Parker, & Taylor, 1994); and social introversion (Millard &
Kinsler, 1991). The "daydreaming" factor was not well replicated, and has been dropped in recent TAS revisions. The current revision -- the TAS-20 -- is relatively new, and Haviland and Reise recommended checking its factor structure and computing subscale scores "whenever practicable" (1996; p.116).

When the TAS-20's factor structure was analyzed for the current sample, the eigenvalue-greater-than-one rule (Cattell, 1966), suggested that a 5-factor solution would be appropriate, but after rotation, one factor contained only the item "Looking for hidden meanings in movies or plays distracts from their enjoyment." A 3-factor solution was considered, but all attempted rotations resulted in collections of items that were theoretically unrelated. For example, "I am able to describe my feelings easily," (which is usually grouped with items capturing an inability to identify or describe emotions) loaded on the same factor as "I prefer to watch light entertainment shows rather than psychological dramas" (which generally fits with items capturing a concrete, external cognitive style). The 4-factor solution chosen was considered the most appropriate in terms of theoretical and psychometric attributes.

The TAS-20 factor analysis results for this study are consistent with those reported by others, but there were also some differences. The first subscale reported by Parker et al., (1993) was named "Difficulty Identifying Feelings." Its items are contained in the current subscales 1 and 2 (Body and Emotions), except for one item. Their second factor, "Difficulty Describing Feelings" was replicated by the current Awkward factor, with the exception of one item, and six out of eight items from their third factor, "Externally-Oriented Thinking," encompassed the current External factor. The other two items were
dropped in the current analysis because they did not load on any factors. The principal
difference between the solution reported by Parker et al., and the current obtained solution,
was our separate cluster of items constituting problems identifying bodily sensations. The
splitting-off of a separate factor for physical sensations could reflect the importance such
items hold for individuals who suffer, or have suffered, from the effects of chronic pain.
Although the current sample did not constitute a chronic pain sample, participants were
recruited on the basis of significant pain experiences, and their pattern of endorsements may
reflect a physical bias.

Naming of factors generally entails subjective interpretation of the items, and the
current analysis was no exception. As discussed, Factors 1 and 2 (difficulty identifying
bodily sensations, and confusion about emotions) have sometimes been combined into one
subscale reflecting inability to identify emotions and distinguish them from the physical
manifestations of emotional arousal or from other bodily sensations. In the case of the
current analysis, however, the first item in Factor 1 (Body) loaded so strongly on one and
only one factor, that it was not feasible to combine it with items on other factors. This item,
together with the other item in Factor 1, seemed to capture a confusion about physical
sensations, and thus was named “difficulty identifying bodily sensations.” Factor 3 (external
cognitive style) was not difficult to name. It appeared to be highly cohesive, since it
contained only 1 complex item and 13 hyperplanes, and the items all captured the concrete
thinking subscale found by other researchers. Factor 4 is closest in essence to the “difficulty
expressing feelings to others” subscale found by others, but was considered best captured by
the title “interpersonal awkwardness,” since the component items seem to imply social
discomfort in relationships. Although “I prefer to analyze problems rather than just describe them” seems to belong with Factor 3 (External), and did in fact load more strongly on this factor than the others, an \textit{a priori} cutoff of .20 had been stipulated, and to reduce it to .17 in light of the results seemed an unreasonable \textit{post hoc} step. Thus, this item was dropped from subscales.

There are other ways to establish the relative robustness of subscales. One is to compare the Cronbach’s alpha coefficients, and examination of these leads to the conclusion that Factors 2 and 4 (Emotions and Awkward) have the greatest internal consistency ($\alpha$ of .84 and .73, respectively, compared with $\alpha$ of .70 and .61 for Factors 1 and 3, Body and External). Another way is to perform item analysis correlations between each item and the total scores excluding that item (Crocker & Algina, 1986). This procedure results in an indication of the discriminative power of each individual item. Factors can then be examined to ascertain which factors contain the most discriminating items, and thus which are more robust. Application of this technique reveals that, of the top ten discriminators, six load on Factor 2 (Emotions) and four on Factor 4 (Awkward). Since these factors consist of six and five items, respectively, it seems that these are the two factors that best capture alexithymia as assessed by the TAS-20 in this sample. There are, however, items with good discriminative power on both of the other factors, suggesting that a four factor portrayal is not inappropriate. The two items with the lowest item-to-total correlations were “I prefer to just let things happen rather than to understand why they turned out that way,” and “I prefer
to analyze problems rather than just describe them.” These were the two items dropped because they failed to load on a factor.

When considering the results of a data reduction procedure, it can be enlightening to examine the participant sample on which the analyses are based. In this series of studies, participants were all female undergraduates, and the majority were recruited from psychology classes. While a few students were over 40, most were under 25, (mean age = 22.75 for the first 70 unscreened participants, and 21.65 for the sample of 90). This accounts for the highly positive skewness (3.37) in the age distribution. From Table 5, it can be seen that, in general, high alexithymia scores were associated with less caregiving experience. No significant relationship emerged between TAS-20 scores and verbal fluency. Most researchers report inverse relationships between TAS scores and word fluency. Perhaps, in the current sample, verbal fluency differences were obscured by overall verbal facility due to university influences.

Tables 1 and 3 show mean TAS-20 scores to be 46.33 (SD = 11.77) for the first 70 unscreened participants, and 49.5 (SD = 12.25) for the full 145 unscreened participants. Parker et al., 1993, report similar descriptive statistics for two comparative groups of Canadian female undergraduates -- one with a mean age of 20.9 (TAS-20 m = 45.13; SD = 11.24), and one with a mean age of 21.1 (TAS-20 m = 47.38; SD = 10.96). For chronic pain patients, the mean is usually higher. For example, when Cox and associates used the TAS-20 to assess alexithymia in 55 consecutive referrals to a Toronto Pain Clinic, they reported a mean score of 56.87 (Cox et al., 1994). There are not many other studies of chronic pain
patients based on the TAS-20, but other TAS versions have also yielded higher mean scores in such groups than for the general population. It seems, in terms of total TAS-20 scores, that the current group is representative more of a student population than a clinical pain group.

**Study 1: Facial Expressions of Emotion**

The study design and statistical analyses allowed several topics to be investigated with regard to alexithymia and emotional sensitivity. The construct of alexithymia involves confusion about experienced affective states, but few studies have successfully demonstrated that this confusion extends to evaluating others' affective states. Overall, results from this study show that high levels of certain alexithymia subscales are associated with flawed discriminative ability in identifying facially communicated emotional states. The mean of summed accuracy scores was 7.70, from a possible distribution of 0 - 14, suggesting that there were no ceiling or floor effects operating for the study task. All obtained correlation coefficients were negative, and remained so even after controlling the effect of depressed mood, but the only one to retain its significance was the inverse association between accurate identification and Factor 2 -- confusion about emotions (Emotions). This finding can bolster our confidence that the Emotions factor provides a valid measurement of a core aspect of the alexithymia construct -- difficulty providing words for feelings -- even when those feelings are modeled by others.
Results provide no evidence that alexithymia levels are related to differences in perceived emotional intensity of posed facial expressions. What is problematic for individuals with high Factor 2 levels of the TAS-20 seems to be identifying the name of the affective state, not estimating the related amount of emotional arousal. These individuals can identify that someone is aroused; they just cannot say why.

When participants were given the option of choosing the label “Pain” for the modeled facial expressions, those with high TAS-20 scores were more likely to do so. After controlling for the effect of depressed mood, frequency of choosing this label was related to Factors 1 (difficulty identifying bodily sensations -- Body) and 2 (Emotions), as well as to TAS-20 total scores. It is, of course, possible that those who selected “Pain” were intending their selection to represent emotional rather than somatic pain, but it is equally possible that the choice reflects confusion between emotions and bodily sensations. Such confusion is a characteristic inherent in the alexithymia construct, and echoes the contention of Lane and Schwartz (1987) that alexithymia involves an unsophisticated level of emotional organization, one where emotions are experienced primarily as bodily sensations. The results from the current study suggest that this level of emotional awareness also applies to alexithymia when the emotions are portrayed by others. This result also provides validation for the first two subscales (Body and Emotions) obtained by the factor analysis procedure.

If individuals with high scores on certain TAS-20 subscales have difficulty identifying affective states, how do they react to facial expressions of emotion? When asked to predict and name their probable emotional reaction, participants’ responses could be
characterized on the basis of their TAS-20 scores. After controlling for the effects of depressed mood, high Factor 2 scores were related to higher numbers of reported emotional reactions that did not “match” the posed expressions. TAS-20 total scores and Factor 2 (Emotions) were negatively correlated with number of “matches.”

Performance on this task is, of course, not independent of accuracy in identifying the posed emotion. Participants with high scores on the TAS-20 Emotions factor were less likely than others to select emotional responses that matched the correct emotional expressions, but were their predicted responses necessarily inappropriate? After controlling for depressed mood, these individuals were still less likely to select emotional responses that could be considered reasonable reactions to the affective states portrayed in the slides. TAS-20 total scores, Emotions, and also Factor 4 (interpersonal awkwardness -- Awkward) were all negatively associated with reasonably congruent emotional reactions.

If individuals with high levels of alexithymia were not predicting their emotional reactions based on the modeled expressions, there seemed to be two possible explanations. First, perhaps their responses were random, or second, perhaps their responses matched their own (usually incorrect) perceptions of the modeled expressions, i.e., the labels they selected for the slides. When the latter possibility was tested, results revealed that the Emotions factor was associated with fewer percept matches, but the correlation coefficient was no longer significant once the effects of depressed mood were partialled out. None of the TAS-20 scores was related to a higher number of percept matches. These results suggest that the relationship between alexithymia and inaccurate predicted emotional responses cannot be
explained by higher concordance between perceived emotion and predicted emotional reaction.

In an absolute sense, few of the participants tended to select their chosen (correct or incorrect) label as their predicted response. Scores, which could range from a minimum of 0 to a maximum of 14 (one point per slide for a perfect match), averaged only 4.32 (SD 2.04), with a range of 0.80 to 10.00. Few participants matched their predicted emotional responses to the correct label ($M = 7.7$, $SD = 2.17$; scores ranged from 1.3 to 14), whereas many more tended to respond appropriately ($M = 12.25$, $SD = 1.75$; scores ranged from 5 to 15). These findings support researchers' reports that facially expressed emotions are generally identified with accuracy (Ambady & Rosenthal, 1992; Ekman & Friesen, 1971). From a developmental perspective, the findings also underscore Maccoby's contention that appropriate responding demands more than affective attunement or synchrony (1992). As Maccoby notes, responding sensitively to another's mood is a multi-stage process requiring accurate identification of the arousal state, empathic understanding of the emotion, and selection of an appropriate response. Alexithymia, it seems, is related to a pattern of random responses to facial expressions of emotion, because the first stage (accurate identification) is not well performed. Impaired ability to differentiate between mood states would limit such individuals to the levels of emotional functioning conceptualized by Lane and Schwartz (1987) as "preoperational."

With regard to the predicted behavioural responses, it was expected that alexithymia, because of its association with poor interpersonal skills and emotional confusion, would be
related to a more avoidant behavioural response style. Although the predicted correlation did emerge with Factor 3 (external cognitive style -- External), the coefficient was no longer significant once depressed mood had been accounted for. Thus, an avoidant behavioural style could be explained by negative affect rather than presence of alexithymia.

**Study 2: Infant Expressions of Pain**

It was hypothesized that an association would be found between alexithymia level and tendency to conceptualize and rate others’ pain as a purely somatic experience. It was expected that this association would emerge as a positive correlation between TAS-20 scores and ratings of sensory intensity, and that a corresponding inverse correlation would emerge with ratings of emotional distress. On ratings of physical intensity -- explained to participants as “the strength of the stimulus” -- the expected positive relationship was found between these ratings and the Body factor. However, and this was a surprising result, a similar finding (a positive relationship) emerged between emotional distress and the Body factor. Once the possible confounding effects of depressed mood and extent of current pain had been controlled, this pattern of results remained significant. Instead of the expected inverse relationship between ratings of emotional distress and alexithymia, a significant positive association resulted with the Body factor.

Consideration of the way individuals with high scores on the Body factor might conceptualize pain suggests an explanation of this finding. Confusion about somatic sensations, including pain, may lead to difficulty in separating the different dimensions of
physical experiences. In the case of pain, as Fernandez and Turk (1992; 1994) posit, many people do not instinctively grasp the distinction between sensory and emotional qualities. We might speculate that the distinction would be even more difficult for those with high levels of alexithymia. Participants with high scores on the Body factor may have believed they were rating the same dimension, rather than disentangling the two aspects. If so, a high somatic intensity rating would necessarily lead to a correspondingly high affective distress rating.

Participants’ emotional distress ratings were inversely related to the External factor, an opposite result to their relationship with the Body factor, but a result that was predicted. Thus, in the case of individuals with an externally oriented, concrete cognitive style (as assessed by TAS-20 Factor 3, External) the hypothesized inverse association with emotional distress ratings did emerge. This factor was not, however, related to a tendency to amplify ratings of sensory intensity.

The pattern of associations between conceptualization of infant pain and alexithymia is complex and difficult to interpret. It is surprising that two TAS-20 factors are independent and have external correlates with different directional signs (positive and negative correlations). Yet other researchers have found different facets of alexithymia to relate to different personality styles. For example, Bagby and colleagues reported that an externally oriented cognitive style is related to low openness to experience, whereas confusion about identifying emotions relates to neuroticism (Bagby, Taylor, & Parker, 1990), and both of these traits are considered orthogonal dimensions in the widely-used 5 factor model of
personality. The oblique rotation conducted in the current studies resulted in the Body and External factors being independent (the intercorrelation between these two factors was $r = - .05$). Post hoc, it seems feasible for a concrete, external cognitive style (often referred to as *la pensée opératoire*; e.g., Nemiah & Sifneos, 1970) to coincide with neglect of the affective dimension in many areas, including conceptualization of others’ pain, yet be unrelated to a proclivity to amplify somatic sensations of pain. It is equally feasible that uncertainty about bodily sensations should correspond with the inclination to interpret others’ pain experiences as unidimensional.

During the brief audiotaped interview, it was hoped to clarify the relationship between alexithymia and conceptualization of others’ pain by revealing differences in managing children’s pain. On the basis of TAS-20 scores, however, no differences emerged between participants’ reported coping techniques. Styles of pain management were scored according to the degree to which participants appeared to recognize the possibility of affective distress associated with the experience of inoculation, and to distinguish this component from sensory aspects of inoculation.

Closer examination of the variables’ distributions suggests that the lack of results could be due to a general inability on the part of all participants to deal effectively with both components. When all comments were analyzed for affective and sensory content, and the results expressed in terms of percentage of total content, the overall means were only 10% for affective ($SD = .12\%$; skewness = 1.73) compared with 23% for sensory ($SD = .14\%$; skewness = .35), suggesting that most participants tended to concentrate on the child’s
physical discomfort. In an attempt to increase validity, open-ended, semi-structured interviews were conducted, and no attempt was made to influence interviewees to discuss children’s emotional issues.

In retrospect, results may have been more productive in discriminating high from low TAS-20 scorers had interviewers asked more structured, specific questions such as “How might the experience affect the child emotionally? What feelings might the child have? How would you deal with these?” The lack of findings from the non-structured interview lend support to a study conducted by Fernandez and Turk (1994). Fernandez and Turk predicted that, when demand characteristics were minimized by providing no allusions to differences between components, participants would fail to differentiate sensory from affective facets of pain. Their results confirmed this prediction, suggesting that legitimate separation of sensory and affective components of pain must be obtained without conveying what Rosenthal (1967) calls covert expectations. If questions like the ones described above are to be used, they should therefore be selected carefully, to ensure that their content is bias-free.

**Study 3: Evaluation of Own Pain Experience**

Describing the subjective experience of pain is obviously different from evaluating pain in others. It was hypothesized, however, that an alexithymic personality style would lead to a similar pattern of conceptualizing own and others’ pain — a pattern of overplaying the sensory facet and underplaying the emotional facet. In fact, when participants rated their
own pain, alexithymia scores were unrelated to ratings of sensory intensity. After controlling for the effects of depressed mood and current pain, a modest but significant positive association emerged between the Awkward factor and ratings of emotional distress. The results are insufficient to warrant strong conclusions, but it appears that any influences between alexithymia scores and retrospective rating of subjective pain cannot totally be explained by the effects of mood, or of being in pain at the time of rating. The absence of strong effects supports the contention that the alexithymia construct may relate more to an undifferentiated view of emotion than to systematic lack of affective arousal. There appears to be very little difference between individuals with high or low alexithymia scores when they are compared relative to the amount of affective arousal involved in pain experiences. The difficulty experienced by those with high scores may arise only when they attempt to name the arousal state they are experiencing.

It was hoped that the audiotaped interview would reveal that the extent of participants' recognition of the affective component of pain was inversely related to their TAS-20 scores, while emphasis on somatic qualities of pain would increase with the TAS-20 scores. After analysis of interview material, however, no significant results emerged between alexithymia scores and quantification of participants' conceptualizations of their pain. As with the interviews regarding inoculation of children, the lack of results may again be due to a general inability to recognize the emotional components of pain experiences. Overall, the mean percentage of affective comments was 9%, whereas the mean percentage for sensory comments was 58%, suggesting that most participants tended to concentrate on
their experiences of sensory discomfort rather than emotional disturbances. Again, interviews were open-ended and only semi-structured, with no attempt to encourage participants to consider affective issues (see Fernandez & Turk, 1994). Specific yet bias-free questions such as “Did you ever feel that the experience affected you emotionally” etc., may have produced some differences. Taylor et al., (1997) contend, however, that even more detailed probing is sometimes needed to uncover the affective deficits involved in the alexithymia construct. Taylor and colleagues recommend asking participants to elaborate upon spontaneously produced emotional words, in order to highlight any inability to fully articulate and describe the subjective nature of the emotions. Taylor et al.’s view supports the clinical impressions recorded by Nemiah and colleagues (1976), wherein they state: “many alexithymic individuals will spontaneously use words such as “sad,” “nervous,” and “frightened;” it is necessary to ask them specifically to state what it feels like to be sad or angry or nervous; only then will it become apparent that they have little or no vocabulary available to describe these affects” (p. 431).

**Overall Summary and Limitations of the Studies**

The results that relate most closely to theoretical expectations occurred in Study 1, where participants dealt with posed facial expressions of emotion. Although the Emotions factor was responsible for the majority of the results, this does not invalidate the findings in terms of the alexithymia construct. Because of the multidimensional aspect of the TAS-20, high scores on some subscales are indicative of alexithymic tendencies (Berenbaum & Prince, 1994). The Emotions factor was found to be the most robust in the current studies,
and is similar to a factor Hendryx and colleagues called “Emotional Awareness Deficits,” (Hendryx et al, 1992). From a statistical analysis based on item response theory, they reported the Emotional Awareness Deficits subscale as most representative of the alexithymia construct, and concluded that “using a total TAS score by itself to indicate alexithymia is inappropriate,” (p.513).

Perhaps the results found in Study 1 can provide some insights to questions from the other two studies. Overall, any implications of the role of alexithymia in the child/caregiver relationship, or insights into the origins of alexithymia, must come by extension of the findings from Study 1. Results suggest that the interpersonal difficulties associated with alexithymia could be explained by difficulties in identifying nonverbal emotional expressions.

The ability to identify others’ emotions is an important skill, and deficiency in this area could have profound and far-reaching effects. In the successful establishment of an adaptive caregiver-child relationship, for example, many of the foremost developmental researchers specify such skills as vital. Maccoby underscores the importance of affective exchanges between caregivers and infants, by pointing out that emotional communication constitutes the first language whereby parents and children communicate before the child acquires speech (Maccoby, 1992). She states that a fundamental part of the communication process depends upon the ability of parents not only to interpret the affective quality of their infants’ arousal states, but also to respond appropriately. Maccoby stresses that appropriate responding demands more than empathically matching a child’s mood. For example, parents
“must respond to a child’s distress with soothing, rather than by manifesting distress themselves, a reaction that sometimes calls for considerable emotional control on the parent’s part,” (p.1013). Results of Study 1 indicate that individuals with high levels of alexithymia would find such fine-tuned levels of emotional response extremely challenging. Similarly, Kochanska (1997) also stresses the importance of mutual responsiveness in parent-child relationships, and proposes that mutual or reciprocal orientation is an important factor for “the future socialization trajectory,” (p.95). In her study of mother-child shared positive affect, measured macro- and microscopically during several interactive contexts, Kochanska found that personality differences among mothers may predispose some to better construct mutually responsive relationships with their children. Women able to adopt others’ psychological perspectives (high on measures of “empathic perspective-taking”), for example, were superior performers. Although Kochanska’s dyads consisted of mothers and toddlers, she recommends that future studies extend to infancy, when factors such as affective attunement and emotional matching play an even greater role in the development of socialization (Kochanska, 1997).

In an attempt to elucidate the genesis of alexithymia, Lumley and colleagues found cross-generational similarities in alexithymia. Independent of depressed mood, mothers’ TAS-20 scores correlated significantly (.34) with those of their offspring (Lumley et al., 1996). The authors speculate that maternal alexithymia may have interfered with the development of affect awareness in their children.
Although the current studies did not involve mother and child dyads, and no particular deficiency in coping with children’s pain-related emotional distress was associated with alexithymia scores, results did suggest that an alexithymic personality style corresponds with low emotional sensitivity in terms of inability to identify affective states. This evidence, together with that of Maccoby (1992), Kochanska (1997), and Lumley et al., (1996) converges on the plausible proposition that alexithymia could be transmitted inter-generationally.

With regard to alexithymia and pain, results demonstrated no unequivocal overall tendency to underrate the emotional distress associated with pain. However, the results of Study 1 demonstrate that individuals with alexithymia would experience more difficulty than would others in discriminating their own affective states. Perhaps such individuals would experience a global sense of negative affect rather than finer-grained mood states. As Lane and Schwartz have suggested, the high-alexithymia versus the low-alexithymia individual may be analogous to a child from Florida compared with a child from Alaska: when “the child from Florida [is] confronted with a snowy landscape, the terrain is perceived and experienced as undifferentiated,” (Lane & Schwartz, 1987, p. 135). Such a lack of discriminative ability could handicap such individuals in learning the skills necessary for applying the principles of successful pain management techniques.

In the era of managed health care, pain treatment facilities are being challenged to demonstrate efficacy of treatment outcome. Keller and colleagues (1995) showed that individuals with alexithymia did not respond well to cognitive behavioural intervention in a
treatment program for cocaine abusers. Therapy was of two types -- cognitive behavioural (which required patients to identify affects and cognitions), and clinical management (which involved education and medication management). Low-alexithymia patients had better outcomes when treated with the former, whereas the high-alexithymia patients showed a better response to the latter, more concrete style of treatment. Some researchers recommend routine assessment of alexithymia in pain clinics (Kauhanen et al., 1994; Mendelson, 1982). After assessment, logical next steps would be the exploration of alternative therapies that do not demand access to internal affective states, such as the ones described in the Keller et al., (1995) study, and evaluation of the efficacy of such treatment approaches with alexithymic patients. Such steps have the potential to influence outcomes in clinical care by engendering more effective doctor/patient communication. The main challenge will be to breach the chasm between sensory discomfort and recognition of the role of emotional factors, and to develop modes of expression for the pain discourse.

Extent of current pain has been shown to affect individuals’ memory for past pain events. The results from Studies 2 and 3 indicate that extent of current pain is related to at least two dimensions of pain ratings -- sensory intensity and emotional distress. Current pain should be measured as a potential confound in any pain judgment study, and its assessment should not be confined to studies involving retrospective accounts of one’s own pain.

There are several limitations in the current series of studies. From a statistical perspective, the sample size of 145 for the factor analytic procedures is small. Some researchers recommend 10 times the number of participants as items, a guideline which
would have necessitated $20 \times 10 = 200$ participants. The Interpersonal Awkwardness factor, although theoretically consistent with the alexithymia construct, did not correlate significantly with appropriate dependent variables, but it is not known whether this is due to sample size or other elements. Results must be considered preliminary, and await replication in larger samples.

As other researchers have found, alexithymia and depression were highly intertwined. There is support, however, for contending that the two are separate theoretical concepts and, given the high somatization inherent in alexithymia, it is possible that some researchers, in failing to remove these items from their affect measures, may have unwittingly exaggerated the relationship between depression and alexithymia. While some statistical relationships in the current studies fell below significance once negative mood was accounted for, others were maintained, independent of the effect of this variable.

This sample generalizes to only one gender, and the stimuli were limited by age and medium. For example, Study 2 could be repeated using stimulus groups other than neonates, and the slides in Study 1 consisted only of posed still pictures rather than spontaneous moving faces. Despite the low ecological validity of posed slides, however, they often represent “purer” emotions than ones likely to occur more naturally. If participants were unable to identify emotions presented in this way, their judgement is unlikely to improve with presentation of real-life stimuli. Nevertheless, a serious limitation of using artificial stimuli and hypothetical situations involves the issue of process. It is not difficult to
establish whether -- or at what point -- participants behave differently in these situations than they would under real-life conditions.

To explore further the relationship between alexithymia and the conceptualization of pain, it may be fruitful (as previously noted) to adopt a more standardized interview format, using overt verbal probes designed to elicit affective information.

A key factor limiting the conclusions that may be drawn from this series of studies is the correlational nature of the analyses. One interpretation of the results in Study 1 is that presence of alexithymia may lead to insensitivity to facially expressed mood states, resulting in social awkwardness. Alternatively, poor social skills may function to preclude the acquisition of such interpersonal experience as identifying facial expressions of emotion, resulting in alexithymia. A third conclusion may be the presence of other, unknown variable or variables lead to: inability to discriminate other's emotions, impaired social skills, and alexithymia. Longitudinal studies would help to provide information about the direction of causality.

The non-experimental nature of these studies suggests that groups with high versus low levels of alexithymia may differ in many ways not yet identified or controlled for. The potential effect of these unidentified factors is not known.

Despite the study's limitations, it seems clear that alexithymia does involve some potent differences. Unlike the child from Florida, who may be able to relocate, the person with alexithymia cannot move to a place where there is no emotion. The undifferentiated
nature of emotional experience s/he encounters pervades all the social exchanges which constitute life as a functioning human being.

This study has not attempted to address the complex issues of treatment of alexithymia. One promising avenue is suggested by the research into empathy. Breaking empathy into component parts provides clinicians with several paths of intervention. If it were possible to teach the skills necessary to develop empathic sensitivity, several far-reaching benefits might be expected to accrue. Overall, emotional intelligence might increase, an improvement might occur in maternal responsiveness; interpersonal competence and self-esteem might be enhanced, and in the area of somatic disorders, skills for coping with pain and other physical sensations may become more attuned. Whatever directions future investigations take, alexithymia will continue to provide a rich medium for exploration and elucidation of a wide range of theoretical fields.
References


### Appendix B

**Twenty Item Toronto Alexithymia Scale**

<table>
<thead>
<tr>
<th>Sex: M/F</th>
<th>Age:</th>
<th>Date:</th>
<th>ID #:</th>
</tr>
</thead>
</table>

**T A S - 2 0**

Using the scale provided as a guide, indicate how much you agree or disagree with each of the following statements by circling the corresponding number. Give only one answer for each statement.

- Circle 1 if you STRONGLY DISAGREE
- Circle 2 if you MODERATELY DISAGREE
- Circle 3 if you NEITHER DISAGREE NOR AGREE
- Circle 4 if you MODERATELY AGREE
- Circle 5 if you STRONGLY AGREE

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Neither Disagree Nor Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am often confused about what emotion I am feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. It is difficult for me to find the right words for my feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. I have physical sensations that even doctors don’t understand.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. I am able to describe my feelings easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. I prefer to analyze problems rather than just describe them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. When I am upset, I don’t know if I am sad, frightened, or angry.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. I am often puzzled by sensations in my body.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. I prefer to just let things happen rather than to understand why they turned out that way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. I have feelings that I can’t quite identify.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Being in touch with emotions is essential.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
### Appendix B, Page 2

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Score Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>I find it hard to describe how I feel about people.</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>12</td>
<td>People tell me to describe my feelings more.</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>13</td>
<td>I don't know what's going on inside me.</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>14</td>
<td>I often don't know why I am angry.</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>15</td>
<td>I prefer talking to people about their daily activities rather than their feelings.</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>16</td>
<td>I prefer to watch &quot;light&quot; entertainment shows rather than psychological dramas.</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>17</td>
<td>It is difficult for me to reveal my innermost feelings, even to close friends.</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>18</td>
<td>I can feel close to someone, even in moments of silence.</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>19</td>
<td>I find examination of my feelings useful in solving personal problems.</td>
<td>1  2  3  4  5</td>
</tr>
</tbody>
</table>
| 20 | Looking for hidden meanings in movies or plays distracts from their enjoyment. | 1  2  3  4  5    

*(Taylor, Bagby & Parker, 1992)*
Appendix C

Verbal Fluency Test

ID #: Date:

I will say a letter of the alphabet. Then I want you to give me as many words that begin with that letter as quickly as you can. For instance, if I say "B", you might give me "bad, battle, bed ...". I do not want you to use words that are proper names such as "Boston, Bob, or Brylcreem." Also, do not use the same word again with a different ending, such at "eat, eating," Any questions? (Pause). Begin when I say the letter. The first letter is "F.

Say "F." Start timing. Write down every word they say. After exactly 60 seconds, say "STOP." Repeat with "A," and finally "S."

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>A</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
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<td>5</td>
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<td></td>
<td></td>
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<tr>
<td>6</td>
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<td>7</td>
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<td>8</td>
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<td>9</td>
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<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
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<td>12</td>
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<td>13</td>
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<td>14</td>
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<td></td>
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<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL:  
Minus Invalid Items:  
Final Score:
Appendix D

Slide Rating Form

<table>
<thead>
<tr>
<th>ID#</th>
<th>Date:</th>
</tr>
</thead>
</table>

For each of these slides, please take a few moments to follow the instructions on both sides of this form. Once you have looked at a slide and decided on your answers, go on to the next one.

**SLIDE # .....

1. For the slide you are now looking at, please select from among the cards in Set A any that you think express the emotion displayed by the model. If you think the model is displaying more than 1 emotion, you may select more than one card. Write down the emotion(s) you select here:

Choose as many cards as you wish, and if you want an emotion that is not listed, write it here:

2. For each emotion you select (one or more) please also decide how strongly you think that emotion is displayed. Indicate this by making a mark on the line for each emotion you choose. Write the card number(s) or emotion(s) on the left.

<table>
<thead>
<tr>
<th>least possible expression</th>
<th>strongest expression imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>least possible expression</td>
<td>strongest expression imaginable</td>
</tr>
<tr>
<td></td>
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<td>least possible expression</td>
<td>strongest expression imaginable</td>
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<td>least possible expression</td>
<td>strongest expression imaginable</td>
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<td></td>
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<tr>
<td>least possible expression</td>
<td>strongest expression imaginable</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>least possible expression</td>
<td>strongest expression imaginable</td>
</tr>
</tbody>
</table>
3. Now, please consider what you think you might want to do in response to a person with this facial expression.

Choose a card from Set B that you think represents what your response would be. Write down the number of the card you select here: ................. If there is no card for the response you would choose, you may write an appropriate response here:

4. If you met a person with this facial expression, which emotion(s) would you feel? Please select a card or cards from Set C and write your choice of card number(s) here:

............... 

If there is no card for your choice(s), you may write other emotions you may feel here:
Appendix E

Cards for Identifying Emotions and Predicting Responses

Sets A and C

<table>
<thead>
<tr>
<th>Fear</th>
<th>Happiness</th>
<th>Surprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disgust</td>
<td>Pain</td>
<td>Anger</td>
</tr>
<tr>
<td>Contempt</td>
<td>Indifference</td>
<td>Sadness</td>
</tr>
</tbody>
</table>

Set B

| I would want to avoid this person in some way. | I would be neutral. | I would want to approach this person in some way |

Note: Labels were presented in a randomized order to each participant, by shuffling the cards before each presentation.
Appendix F

Rating Form for Infant Pain

ID# .................. Date: .............................................

Please read these instructions:
Individuals react differently to different levels of pain. A little pain may make some individuals highly distressed, while a lot of pain may not particularly distress other individuals.

Please watch the following film clips of 24 newborn babies undergoing a routine medical procedure in hospital. After you see each baby, please complete both sides of this 2-sided form (one separate form for each baby).
Rate the degree of pain you think was inflicted on Baby Number ........ during this event.
Check one of the following:
The amount of pain inflicted on this baby was:

Extremely Intense
Very Intense
Intense
Strong
Slightly Intense
Barely Strong
Moderate
Mild
Very Mild
Weak
Very Weak
Faint
No Pain

If the words you want are not here, please choose the one that comes closest to describing what you want to say, and also write the words you would have liked to say here:

Please Turn Over...
Recall that some individuals are highly distressed by pain, while others do not become particularly distressed by pain. Please rate how distressed you think Baby Number ...... was during this event.

Check one of the following:

The emotional distress that this baby experienced was:

Very Intolerable
Intolerable
Very Distressing
Slightly Intolerable
Very Annoying
Distressing
Very Unpleasant
Slightly Distressing
Annoying
Unpleasant
Slightly Annoying
Slightly Unpleasant
No Distress

If the words you want are not here, please choose the one that comes closest to describing what you want to say, and also write the words you would have liked to say here:
Appendix G

Own Pain Questionnaire

ID# ................. Date: ........................................

Please read and follow the instruction on both sides of this form.

When you volunteered to participate in this study, you indicated that you suffered a physically painful experience during the past year, and that this experience had lasted for at least one week. Please now consider this painful experience.

When did it occur? (approximate date) ..............................................................

How long did it last? (approximate number of days) ...........................................

Try to remember experiencing this pain. When it was at its worst, how much did it hurt physically?

Check one of the following:

As far as I can remember, when the pain was at its worst, it was:

Extremely Intense
Very Intense
Intense
Strong
Slightly Intense
Barely Strong
Moderate
Mild
Very Mild
Weak
Very Weak
Faint

If the words you want are not in this list, just choose the one that comes closest to describing what the pain was like physically. Please also write the words you would have liked to say here:
Appendix G, Page 2

Some individuals are highly distressed by pain, while others do not become particularly distressed by pain. Please rate how distressed you remember being by this pain experience when it was at its worst.

Check one of the following:
The emotional distress that I experienced was:

Very Intolerable
Intolerable
Very Distressing
Slightly Intolerable
Very Annoying
Distressing
Very Unpleasant
Slightly Distressing
Annoying
Unpleasant
Slightly Annoying
Slightly Unpleasant
No Distress

If the words you want are not here, please choose the one that comes closest to describing what you want to say, and also write the words you would have liked to say here:

Are you in pain right now?  Yes/No

If yes, please rate your pain right now on a scale of 0-100, where 0 = no pain at all, and 100 = the worst pain you’ve ever had or could ever imagine.

Rating: ..........
Appendix H

Participant Consent Form

Study on Personality Differences, Pain, and Emotion

Kenneth D. Craig, Ph.D. Shirley M. Louth, M.A. Neda Dadmond, B.Sc.
Dept. of Psychology Dept. of Psychology Dept. of Psychology
UBC ph. 822-3948 UBC ph. 822-5280 UBC ph. 822-5280
(Faculty Advisor) (Student Investigator) (Student Co-Investigator)

We are studying the relationship between personality styles and the way people think about pain and emotion. We are interested in the ways in which different people evaluate their own pain, and how they react to pain experienced by infants. We are also interested in the different ways people interpret facial expressions, and how they react to emotions expressed facially. Potential benefits that may be derived from such studies include: designing effective pain treatment programs for people of different personalities; discovering how nonverbal communication is affected by personality differences.

You will be asked to complete some paper and pencil questionnaires asking about your personality, answer some questions into a tape recorder about pain you have experienced, try to identify emotions from photographs of faces, and watch a videotape of infants who may be in pain. The study will take about one hour of your time, for which you will receive $10.00.* We would appreciate your help and cooperation, but you are completely free to withdraw from the study at any time and you will still be paid/receive credit for your participation.

This research represents a dissertation thesis study.

Data obtained in this study will be kept confidential and used for research only. To assure anonymity, volunteers will be identified by a number. Thank you for your time, and if you have any questions about the procedures or about the study in general, do not hesitate to ask or to contact any of the above people.

***************

PLEASE READ AND SIGN BELOW

I agree to participate in this study subject to the condition that the information is kept in confidence and used for research only. I am aware that I can stop my participation at any time without penalty. I also acknowledge that I have received a copy of this form.

Name:

I Agree to Participate: Signature:

Date:

*Note: The alternate clause “for which you will receive 1-1/2 course credits” was used where appropriate.
Appendix I

Participant Demographic Information

ID #: Date:

Please complete the following information:

Date of Birth: Age:

Do you have any children? Ages?

How many brothers/sisters do you have?

Thinking of all the infants/children you have ever looked after in your life, how much total caregiving experience have you had? Using the scale below, please select a number between 1 and 5, and write it below the scale.

1 = minimal (none, hardly any, just occasional)
3 = average (some sibling care, some babysitting)
5 = extensive (lots more than the average student; for example, if you have children of your own, or have cared for infants/children long term such in a daycare, or been responsible for children of family/friends for long periods).

Based on the above scale, please choose any number from 1 to 5 and write it here:

    Amount of Caregiving Experience: _____

Appendix J

Child Pain Interview
Instructions to Interviewer

Begin by saying: “Your responses to the following questions will be tape recorded. Answers will be anonymous, and will be identified only by a number.”

“Please imagine that you are the mother of a five year old child who you will be taking to the clinic for a routine vaccination. What are some of the ways you might prepare the child for this experience? How would you deal with the child during the procedure? How would you treat the child directly after the procedure is over?”

Try to prompt with nonspecific prompts like “Mmmhmmm; uhh huh,” etc., as well as nodding and looking expectant. When this no longer elicits responses, go to the next question.

For each answer provided, ask “Why would you do that?”

If the participant refers to “comforting” the child, ask “How would you comfort them?”
Appendix K

Own Pain Interview
Instructions to Interviewer

Begin by saying: “Your responses to the following questions will be tape recorded. Answers will be anonymous, and will be identified only by a number.”

“I would like to know more about the pain that you have referred to. Would you tell me about it. First of all, (1) Where was it? (2) What did you feel like? (3) Did the pain change at all, over time? If “YES,” ask: “What affected your pain -- what made it worse, and what made it better?” (4) How did it affect your life?” Finally, ask: (5) “Is there anything else you’d like to say about the experience?”

(Try to prompt with nonspecific prompts like “Mmmhmmm; uhh huh,” etc., as well as nodding and looking expectant. When this no longer elicits responses, go to the next question).
Appendix L

Debriefing Form

Dear Students:

Thank you for taking the time to participate in our study on personality differences, pain, and emotion. The purpose of the study was to investigate the way various types of people, differing in their levels of emotional awareness, think about their own pain, and how they think about infant and child pain. In addition to investigating different people’s styles of thinking about pain, we were interested in how they assess others’ facial expressions of emotion.

The participants in this study were measured on aspects of their personality and emotionality, and asked to describe their own pain, the levels of pain experienced by infants in videotapes, and to decide what emotion(s) were expressed by models posing certain facial expressions. We are hypothesizing that people who tend to express less emotion in general will also express less emotion about pain -- their own and that of others. We are also hypothesizing that such people will find it hard to assess others’ facial expressions of certain emotions.

If you are interested in learning more about the emotional side of pain, or about judging facial expressions, the following references are a good place to start. In addition, if you are interested in the results of the present study, please feel free to contact Dr. Ken Craig’s lab at 822-5280. The study will be completed by the end of the calendar year, and we will have some preliminary results by then.

Thanks again for your help with this project.

Shirley Louth, M.A., UBC. 822-5280
Ken Craig, Ph.D., Professor, UBC. 822-3948

References:
R.A. Sternbach (Ed.), The psychology of pain, (2nd ed.). NY: Raven Press.