THE INFLUENCE OF PSYCHOLOGICAL THERAPY ON
IMMUNOREGULATION OF LATENT
EPSTEIN-BARR VIRUS

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by
Julia B. Pivovarova
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Previous research has shown that emotional disclosure of traumatic or stressful experiences is associated with health improvements and immunological modulation. The present study examined how psychological therapy might modify immune response, as measured by IgG antibody titers to Epstein-Barr virus. Eighteen healthy undergraduates (15 women, 3 men) were randomly assigned to either a counseling or control counseling group. Experimental subjects met with graduate students in a marriage and family therapy (MFT) program for seven weekly 50-minute individual sessions to discuss stressful or traumatic life experiences. Blood was drawn shortly before the first and after the last session. Subjects completed the Scale of Self-Deceptive Enhancement (SDE), a Global Measure of Perceived Stress, and an overall health measure prior to their first counseling session. Perceived Stress was assessed again after the last therapy session.
Subjects in the control counseling group underwent the same procedure. They met with MFT students for the same amount of time to discuss trivial issues.

The findings suggest no significant differences between counseling and control counseling groups in EBV antibody titers at baseline. In addition, there were no baseline differences between the two group’s perceived stress, or self-deceptive enhancement. However, perceived stress scores at time one approached a significant correlation with EBV antibody titers pre-sessions; perceived stress scores at time two approached a significant correlation with EBV antibody titers post-sessions. These findings suggest that a significant relationship between perceived stress levels and EBV antibody titers might be found since this is an ongoing project. As predicted, the participants in the counseling group disclosed significantly more than those in the control counseling group. Results suggest no influence of psychotherapy on immunoregulation of latent EBV. However, continued data collection may provide evidence that perceived stress levels are positively correlated with EBV reactivation.
CHAPTER I

INTRODUCTION

The field of psychoneuroimmunology (PNI) studies human health from an interdisciplinary perspective by combining disciplines such as psychology, immunology, physiology, pharmacology, psychiatry, and endocrinology. The term “psychoneuroimmunology” was created by Solomon and Moos in 1964. However, the landmark article in the field was published by Ader and Cohen in 1975, in which they demonstrated that the immune system could be classically conditioned. This finding was critical because, up until that time, the immune system was assumed to function independently of the nervous system and, therefore, was considered not responsive to psychological changes. Ader and Cohen’s work (1975) opened the door to the possibility that psychological factors could alter people’s immune functions.

This project presents research on the effects of psychological counseling on the immune system. Specifically, it addresses how Epstein-Barr virus (EBV) antibodies may change when a person is undergoing psychological counseling. In addition, this investigation explores how personality traits may influence a client’s counseling experience and, therefore, alter that person’s immune response. Specifically, people who are dependent on repressive coping to control their anxiety may be less likely to disclose their unwanted thoughts and feelings and, therefore, may have fewer health benefits from psychotherapy.
The Immune System

The immune system protects the organism from pathogens, which are foreign invaders such as viruses, fungi, bacteria, and other threats. Although we are continually surrounded by pathogens, our skin and mucous membranes prevent most from entering our bodies. Over time, however, it is inevitable that some will enter the body and have to be neutralized.

In this case, the first line of defense against pathogens is nonspecific protective mechanisms. These mechanisms are only able to distinguish between what is self and non-self. When this system detects something that is non-self, it quickly moves to destroy it through a variety of measures. For example, there are a group of cells aptly called “phagocytes”—literally “cell eaters.” When these cells encounter something that is non-self, they wrap their own plasma membrane around the invader, trapping the invader inside.

Macrophages are a subset of phagocytes, and they are the “big eaters” of the immune system. In some ways, macrophages are the most fundamental cell of the immune system. They initiate and coordinate so many actions of the immune system that it is not surprising that no vertebrate on earth is without active macrophages (Mizel & Jarrett, 1977). Macrophages, like all phagocytes, engulf foreign invaders, but that is just the beginning of the chain reaction they initiate against pathogens. Once the pathogen is consumed, it is broken down and the fragments are then displayed on the macrophage’s plasma membrane. These fragments function as an antigen to alert other immune cells of the invader. Fortunately, the macrophage is still marked as part of the “self” because the antigen is combined with a major
histocompatibility complex (MHC). MHC functions as a kind of protein platform that the antigen is connected to. The MHC allows other immune cells know that even though the macrophage is displaying an antigen, it is still part of the self, and should not be attacked.

Whereas macrophages only distinguish between self and non-self, the next step involves T helper cells, which are specific for a particular antigen. Because there are hundreds of thousands of antigens in the world, there are also hundreds of thousands of T helper cells, each prepared for the one antigen it can recognize. This army of T helper cells continually circulates throughout the body, always scouting for that single target. When a T helper cell encounters a macrophage displaying the antigen it has been looking for, the next step in the chain begins.

T helper cells have a CD4 protein that “docks” with the macrophage’s major histocompatibility complex. Once this docking is complete, the macrophage activates the T helper cell by releasing cytokines such as interleukin-1. These cytokines prompt the T helper cell to clone itself rapidly. The newly activated T helper cells release interleukin-2, which stimulates more macrophages to hunt down foreign invaders. In addition, the clones of the T helper cell, each specific for the same antigen, now spread out to enlist new recruits in the fight against the invader.

B cells, like T helper cells, are specific for only one antigen. As a result, there are hundreds of thousands of them dormant in the lymph nodes and spleen, each waiting to be called into action. When an activated T helper cell meets a B cell that is specific for the same antigen, they dock with each other. As before, the T helper cell’s CD4 protein binds with the B cell’s major histocompatibility complex and releases interleukin-2. This activates the B cell to clone itself. These clones quickly mature into plasma cells to start
creating antibodies directed against the antigen that started the process. Despite only living a few days, B cells can create about 2000 molecules of antibody per second (Kuby, 1992).

Antibodies are proteins that circulate throughout the body and attach themselves to the antigen they are specific for. This binding can prevent the antigen from infecting new cells, and cause the antigens to clump together in a process called agglutinization. Once antigens are rendered inactive and clumped together, they can be destroyed quickly by other immune cells (Schindler, Kerrigan, Kelly, & Hollen, 2005). Thus, although antibodies do not destroy antigens, they facilitate other immune cells in doing so.

There are five classes of antibodies, called immunoglobulins (Igs). They are IgM, IgD, IgG, IgA, and IgE. This discussion will focus on IgM and IgG because they are most responsible for initial and secondary immune responses. When first activated, a B cell produces IgM antibodies. This immunoglobulin is comprised of five “Y” shaped molecules that are particularly effective in clumping antigens together for destruction. However, after a time, the B cell switches to producing IgG antibodies to combat the same antigen. IgG is the most common antibody. Once a B cell has switched from producing IgM to IgG it cannot go back to producing IgM. Thus, knowing what class of immunoglobulin is being produced provides an indication of how long the antigen has been battled.
Viruses

One ongoing task for the immune system is the control of viruses. Viruses are little more than a piece of genetic material (DNA or RNA) with a protein coat. To reproduce themselves they must penetrate a host cell and incorporate their genetic material into the host cell’s DNA. After this process of reverse transcription is complete, the virus can use the cell’s own machinery to make new copies of itself.

Viral DNA may affect the cell immediately or stay dormant. During the dormant viral phase the process of viral replication is masked, and often causes no obvious damage. This process is called latent infection or lysogenic cycle of replication. However, in time, it is likely that the virus will eventually form new copies of itself that will eventually burst out to infect new cells. As with any antigens, B cells create antibodies to combat viruses. The initial viral infection produces IgM antibodies against it. In contrast, later “re-emergent” expression of the virus prompts IgG antibodies.

Epstein Barr virus (EBV) is a human herpesvirus that infects B cells (Henle & Henle, 1982). Although about 95% of adults between 35 and 40 in the United States are infected (National Center of Infectious Disease [CDC], 2008), most people show no clinical signs of EBV infection and, therefore, are unaware that they are infected. However, B cells latently infected with EBV persist for the life of the person (Glaser, Pearson, Bonneau, Esterling, Atkinson, & Kiecolt-Glaser, 1993).

When an infected person is healthy and not undergoing excessive stress, the EBV infection usually remains latent but, during illness or stressful periods, the newly created viruses break forth to infect new cells. When these viruses are released, the immune system creates IgG antibodies to combat the virus’s re-emergence. Therefore,
higher levels of EBV IgG antibodies indicate that the person is undergoing some kind of strain, whereas lower levels of EBV antibodies indicate that the immune system is keeping latent EBV in check (Glaser, Kiecolt-Glaser, Speicher & Holiday, 1985; Glaser, Pearson & Jones, 1991; Glaser, Rice & Sheridan, 1987). Among current immune measures, the re-expression of EBV is the most sensitive to psychosocial stressors (Herbert & Cohen, 1993; Van Rood, Bogaards, Goulmy, & Van Houwelingen, 1993).

The current research hypothesizes that psychological factors will affect participants’ immune responses. Specifically, it is predicted that participants who undergo psychotherapy will have a decrease in their EBV IgG antibody titers. However, not all participants are expected to benefit equally. It is predicted that participants who rely on repressive coping to control their anxiety may be less able to discuss their unwanted thoughts and feelings freely. As a result, those participants are expected to have less change in their EBV antibody titers.
CHAPTER II

LITERATURE REVIEW

Psychologists have been interested in the relationship between counseling and people’s psychological well being for decades. Disclosure of inner conflicts and processing of unresolved issues often allows a therapist to distinguish a true problem (Pennebaker, 1995), and help a client overcome psychological distress, which may lead to improvements in all facets of a person’s life.

Although there is a wealth of evidence that emotional disclosure enhances the immune system (Esterling, Antoni, Fletcher, Margulies, & Schneiderman, 1994; Booth, Petne, & Pennebaker, 1997; Petne, Booth, Pennebaker, Davison, & Thomas, 1995), it is still unknown whether clients undergoing psychotherapy are reaping these benefits. Presumably, these clients are undergoing emotional disclosure and, therefore, should be experiencing immune enhancement; however, there are currently no data to support this assumption. It seems obvious that various factors play a role in immune system benefits through emotional disclosure. As discussed, people frequently use repressive coping strategy when they are unwilling or unable to disclose distressing events in a deep, meaningful way and, as a result, may have limited immune improvements. Repressive coping strategy serves people to keep ego-threatening information from entering their conscious awareness. In this thesis, I attempt to make connections between emotional
disclosure, repressive coping, and various health outcomes, including immunological response, specifically EBV antibody titers.

The Concept of Emotional Disclosure in Various Theoretical Orientations

The idea that emotional disclosure can relieve symptoms associated with past distressing events was originally introduced by psychodynamic theory (Breuer & Freud, 1895/1966), suggesting that disclosure can facilitate “reorganization of intrapsychic and interpersonal dynamics” (Marlo & Wagner, 1994, p.194). Other theoretical orientations revised the basic psychological concepts and called emotional disclosure the primary component of psychotherapy (Ellis, 1962; Perls, 1969; Rogers, 1951). Several psychological theories developed over the last few decades offer an explanation why talking about traumatic events can result in positive physical and mental health changes. For instance, relational theory puts forward the idea that talking about trauma creates intimacy between people, and helps in establishing a supportive social environment (Classen, Koopman, & Spiegel, 1993). Furthermore, disclosure helps people to reorganize their experiences, gaining new insightful meanings. (Meichenbaum, 1977; Silver & Wortman, 1980).

Behavioral theory suggests that the experience of telling an emotional life story promotes healthy reactivity to stress. Similarly, the theory of social psychology links disclosure with development of adaptive coping strategies (Pennebaker & Sussman, 1988). Finally, the inhibition theory introduces the idea that constraining of thoughts and feeling results in constant stress; on the other hand expressing emotions leads to both physical and psychological benefits (Pennebaker, Barger, & Tiebout, 1989). In summary,
several theories provide evidence that people benefit from expressing their emotions related to stress and trauma. Presumably, this disclosure is more advantageous when people are in a safe environment, such as psychotherapy, where they can reveal their secrets and gain new emotional awareness.

The Role of Emotional Disclosure on Health

Emotional disclosure is the process of people expressing stressful, traumatic, or shameful experiences from their past. The confidentiality of psychotherapy protects a person from social judgment and prejudice, and should foster emotional disclosure. Although emotional disclosure has long been thought to have psychological benefits, many researchers are finding that it has immune benefits as well.

Pennebaker, Kiecolt-Glaser, and Glaser (1988) were the first to provide evidence that emotional disclosure causes improvements in immune function. These researchers randomly divided undergraduate participants into two groups: the control group was instructed to write about trivial events for 20 minutes for four consecutive days and the emotional disclosure group was instructed to write about traumatic events from their past for the same amount of time. The researchers found that participants in the emotional disclosure group had improved immune function (i.e., increased lymphocyte proliferation to mitogens, indicating that these immune cells were working more effectively) and fewer visits to the campus health center than participants in the control group.

These initial findings have been replicated using a variety of health and immune measures. For example, emotional disclosure has been found to decrease students’ visits to their campus health center (Cameron & Nicholls 1996; Greenberg &
Stone 1992; Krantz & Pennebaker 1996; Pennebaker & Francis, 1996), increase T helper cell levels (Booth et al., 1997), lower hepatitis B antibody titers (Petrie et al., 1995), and increase natural killer cell activity (Christensen, Edwards, Wiebe, & Benotsch, 1996).

Although these data are encouraging, it seems likely that personality variables play a role in how much participants benefit from emotional disclosure. Asendorpf and Scherer (1983) have found that there are significant differences in people’s tendencies to report negative emotions like anxiety, tension, anger and depression. For example, people who use a repressive coping strategy are particularly motivated to keep negative emotions from their conscious awareness. Certainly people are not fully aware of their negative emotions would be unable, or perhaps unwilling, to express them through emotional disclosure. The next section addresses this possibility.

Repressive Coping

The idea of repressive coping is very simple; thinking deeply about our failures, embarrassing experiences and unwanted characteristics quickly prompts us to feel negative emotions, such as anxiety and shame. Because we don’t like to feel negative emotions such as anxiety and shame, we are highly motivated to avoid thinking about our failures, embarrassing experiences and unwanted characteristics. Stripped to its essentials, the notion of repressive coping simple and obvious.

We all know that we have flaws, but a part of psychological health is the ability to ignore those flaws, at least to some degree. A relentless focus on our negative traits and failures would cripple us in our everyday life so we create “positive illusions” about ourselves that allow us to function in our day-to-day affairs. These positive illusions have
been proposed to be a crucial component of self-esteem (Kohut, 1977) and, used in the right amount, may be physically healthy for us (Taylor, Lerner, Sherman, Sage, & McDowell, 2003). Thus, repressive coping is simply our inclination to deemphasize, or ignore, our negative traits, and overemphasize our positive traits.

Repressive coping is, therefore, something we all do, although it is important to emphasize that we use this strategy to different degrees. Some people are inclined to see themselves in a more realistic, and perhaps, harsher light. Although this may not be a healthy strategy (Pennebaker et al., 1988), having too many positive illusions about oneself becomes outright narcissism, and is not healthy either (Breuer, & Freud, 1966). For example, Esterling, Antoni, Kumar and Schneiderman (1993) found that people who routinely use high levels of repressive coping had high resting levels of EBV antibody titers. Later they found that emotion disclosure reduced EBV antibody titers, although they were reduced the least in people who had high levels of repressive coping (Esterling et al., 1994).

Rationale for Current Study

The proposed study will improve on current research in two main ways. First, although there is a wealth of evidence that emotional disclosure enhances the immune system, it is still unknown whether clients undergoing psychotherapy are reaping these benefits. Presumably, these clients are undergoing emotional disclosure and, therefore, should be experiencing immune enhancement; however, there are currently no data to support this assumption. The current proposal will test this hypothesis by measuring the EBV antibodies of people undergoing psychological counseling through the Counselor Training Center of California State University, Chico.
The second goal is to understand better how repressive coping plays a role in immune changes from emotional disclosure. People who frequently use this strategy may be unwilling or unable to disclose distressing events in a deep, meaningful way and, as a result, may have limited immune improvements. Esterling et al. (1994) have found some support for this notion--unfortunately, they assessed repressive coping with an unusual and poorly validated measure. Thus, although the idea is compelling, clear data to support it are still needed.

Full details of the proposed study are provided in the following Methods section but, put briefly, participants will be in our lab at two time points. At the beginning of each participant’s counseling sessions, he or she will contribute a blood sample and be asked to complete some personality, demographic, and health measures to control for possible confounding variables. Then, at the end of the participant’s counseling sessions, he or she will contribute a second blood sample and complete measures related to those from the beginning before being debriefed. A control group will undergo the same procedure, but will talk about trivial events for the same amount of time as the clients in therapy. It is predicted that counseling clients will have a greater decrease in EBV antibodies, indicating greater immune efficacy, than participants in the control group. Furthermore, it is predicted that participants in the experimental group who heavily rely on repressive coping will have less of a decrement in their EBV antibody titers.
CHAPTER III

METHOD

Eighteen participants (15 women) between the ages of 18 and 40 ($M = 23.3$, $SD = 4.35$) were recruited for this research. Seven were recruited to be in the control group (i.e., they received control counseling [explained in Procedure]) and eleven were recruited to be in the experimental group where they received actual psychological counseling. Of the seven participants in the control group, four were seropositive for EBV and all eleven participants in the experimental group were seropositive for EBV. Thus, for the data analysis, there were four participants in the control group (2 women) and eleven participants (10 women) in the experimental group.

Participants were recruited from undergraduate classes of California State University, Chico (CSUC) and Butte College. Participants were recruited in the fall 2008 and spring 2009 semesters in several ways. Posters were placed in the waiting rooms and nearby hallways of the Counseling Training Center (CTC) on the CSUC campus. The CTC is where participants can receive free counseling from graduate students in the counseling psychology program who are supervised by faculty. Additional posters were placed in Modoc Hall, which is where most psychology classes take place. Finally, presentations were done in the CSUC and Butte College classrooms encouraging students to participate in the research. Students received extra credit in their courses for participating in this research.
Participants were excluded from the study if they were using prescription medications, recreational used drugs, were heavy cigarette smokers (more than 1 pack/week), had excessive alcohol intake (3 or more drinks daily or binge drinking [6 or more drinks in one bout]), were pregnant, had a history of chronic mental or physical illness, or had skin reactive diseases that might contribute to immunological dysregulation (e.g., eczema). Participants were also required to be free of symptoms that might indicate an infection within the previous month (for these exclusionary criteria, cf. Esterling et al., 1994).

Materials

Blood Samples

All blood samples were obtained by licensed phlebotomists in vacuum tubes with anti-coagulant. The samples were centrifuged and the serum was aliquoted into cryogenic vials and frozen at -70°C within four hours of when the blood was drawn. EBV VCA IgG antibody titers were assessed using the enzyme-linked immusorbant assay (ELISA) method. The commercially available kit used (DiaSorin Corporation, Stillwater, MN, #1606A) measures antibodies against one viral capsid protein, the p18 polypeptide. A capsid is the protein shell of a virus, and the p18 polypeptide contains epitopes of the viral capsid antigen (VCA) complex, which means that this is a part of the antigen that can be identified by the immune system. The p18-VCA IgG in the samples bind with the p18 peptide on the plate’s wells. Antihuman IgG labeled with horseradish peroxidase is added to a chromagen substrate that reacts with the antigen-antibody complex to produce color. The amount of p18-VCA IgG antibody is then measured by the absorbance of each well measured at 450 nm. All samples, calibrators and controls, were run in duplicate.
The intra-assay coefficient of variation was 5.3% for the one 96-well plate that was analyzed, indicating that any variance between duplications was well within acceptable levels.

Psychological Measures

The scale for Self-Deceptive Enhancement (SDE; Paulhus, 1998) is designed to measure characteristics that are culturally sanctioned and approved, but unlikely to occur. For example, endorsing an item such as “I never regret my decisions” or denying an item such as “It would be hard for me to break any of my bad habits” may be accurate appraisals of one’s behavior. However, endorsing several such items strains one’s credibility by simply being “too good to be true.” As a result, high scorers on the SDE are “overclaiming” positive characteristics and “underclaiming” negative ones. Although those who score high in SDE are making many unrealistic claims about themselves, they seem to consciously believe those unlikely assertions (Ennis & Plotkin, in preparation).

Because antibodies to EBV are sensitive to a variety of psychosocial stressors (Van Rood, Bogaards, Goulmy, & Van Houwelingen, 1993) the Perceived Stress Scale (PSS; Cohen, Kamarck & Mermelstein, 1983) was administered before and after their counseling or control sessions. The PSS measures the degree to which situations in a person’s life are perceived as being stressful and was used to control for EBV antibody changes unrelated to emotional disclosure. In addition, to investigate all the possible confounding variables, a self-report questionnaire was used to assess participant’s overall physical health.
Procedure

The recruitment posters informed the participants about the opportunity to receive free psychological counseling services and participate in the study as a part of their treatment. The participants were instructed to contact a member of the research team. In addition, the study was presented in classrooms at Butte Community College and California State University, Chico (CSUC). The counseling services were offered through the CSUC Counseling Psychology program, and conducted by advanced graduate students. The trainees were qualified to work with clients under supervised conditions. Each graduate counselor was closely supervised. The sessions were video taped and reviewed by CSUC psychology professors and a therapy team of 3-7 fellow graduate students.

Students sent their applications to the CSUC Counseling Training Center (CTC) indicating their willingness to participate in the study. According to the standard practice of the CTC, clients seeking psychotherapy were assigned to a therapist (an MFT student), who contacted them to set up the initial therapy session. The clients signed an informed consent, where they agreed to participate in counseling, being audio-video taped, and being tested as deemed pertinent to counseling. In addition, therapists signed an informed consent, indicating that they agree to work with clients who decided to participate in the research. Therapists were not informed whether their clients were a part of the research study or not.

The clients were contacted by a member of the research team to set up an appointment with a phlebotomist. We attempted to schedule participants the day before their first counseling session, or as close to that as possible, but no more than one week
prior to their first session (cf. Esterling et al., 1994). Participants were reminded of the exclusionary criteria, and if those were met a time was arranged to meet at the lab. The participants were asked to come to the research lab individually. After providing written consent to participate in the study, the clients completed personality measures to account for possible misleading variables; the Scale for Self-Deceptive Enhancement (SDE; Paulhus, 1998), a Global Measure of Perceived Stress (Cohen et al., 1983), and an overall health measure (including, e.g., calories/day, physical activity/week, sleep/day, lean body mass; cf. Esterling et al., 1994).

All clients were instructed to read the instructions before they answered the questions. All these measures were administered by the research team, who checked that each participant’s contact information was still current. Participants were assured that only the researchers had access to their measures. All measures were kept in a locked file cabinet and were marked by the clients ID number to ensure confidentiality.

Following this, a licensed phlebotomist took a first blood sample from the participants. All together this portion of the study took about 40 minutes. Blood samples were centrifuged and frozen the same day. Participants’ blood was assayed to determine whether they have been infected with EBV using criteria outlined by Roberts (1989) (cf. Esterling et al., 1994). If participants were not infected, they were contacted and told that they would not have to continue the study, but would still receive the full extra credit.

The clients were told that soon after the end of their counseling sessions, they would be asked to contribute another blood sample and complete some brief questionnaires. This portion of the experiment was expected to take about half an hour. If participants were seropositive for EBV, they remained in the study.
Participants in the control group went through the same procedure just described. They were assigned to meet with an MFT student for the same amount of time (seven sessions, 50 minutes each). MFT students, who worked with control condition participants, were instructed to avoid discussing emotionally distressing experiences with their clients, and focus on the trivial issues, such as their clients’ favorite hobbies, movies, books, sports, etc. All sessions were videotaped and erased at the end of the research study.

At the end of their therapy (or control) sessions, participants again completed personality measurements and had their blood drawn. Because there was variance in how long participants remained in therapy, the exact time between the first and second blood draw had to be determined on a case-by-case basis. However, participants had to undergo at least 5 hours of counseling. The second blood draw occurred as soon as possible after the last counseling (or control) session.
CHAPTER IV

RESULTS

There were no significant differences between counseling and control counseling groups in EBV antibody titers at baseline, $t(13)=1.239$, $p=.237$. Therefore, any subsequent differences cannot be attributed to pre-existing differences. In addition, there were no baseline differences between the two group’s perceived stress (PSS), $t(13)=1.316$, $p=.204$, or self-deceptive enhancement (SDE), $t(13)=.315$, $p=.756$. However, it is noteworthy that for the entire sample (i.e., the counseling and control counseling groups combined), baseline PSS approached a significant correlation with baseline EBV antibody titers, $r=.45$, $p=.089$, and PSS at time 2 approached a significant correlation with EBV antibody titers at time 2, $r=.46$, $p=.082$. The current research is a work in progress and, if these trends continue, continued data collection may very well produce significant results.

The main hypothesis was that EBV antibody titers would decrease over time in the counseling group more than the control counseling group. A mixed-design analysis of variance (ANOVA) was used to compare EBV antibody titers between groups (counseling and control counseling) and within groups as a repeated measure over time. However, there was no main effect of group $F(1,13)=1.5$, $p=.242$, or time $F(1,13)=.698$, $p=.419$, and no significant interaction, $F(1,13)=.193$, $p=.668$. Adding SDE as a covariate did not significantly change these results, $F(1,12)=1.208$, $p=.293$. 

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An independent samples t-test was conducted to examine differences and compare disclosure scores between counseling and control counseling groups. There was a significant difference in disclosure scores for those in the counseling group ($M=6.36$) and control counseling group ($M=2.71$), $t(16) = -8.72, p<.001$ (see Figure 1).

![Figure 1](image.png)

*Figure 1.* Emotional disclosure by group.
CHAPTER V

DISCUSSION

The present study is the first known to examine the relationship between psychological counseling and immunological benefits. The findings of this study extend the knowledge about written emotional disclosure developed by James Pennebaker (1987, 1988, 1996) and colleges. The aim of the present study was to test the hypothesis that verbal emotional disclosure in psychological counseling is associated with immunological benefits. With respect to the importance of written disclosure, talking about distressing emotional experiences is more commonly used among people to release negative affect. The advantage of this study is that it was conducted in a natural setting, versus laboratory. Even though in a natural setting it makes hard to account for all possible confounds, the results have higher validity.

Data support the notion that EBV antibody titers were sensitive to participant’s stress, as previously was found in a number of studies (Glaser, Pearson, Bonneau, Esterling, Atkinson, & Kiecolt-Glaser, 1993; Glaser, Pearson, & Jones, 1991). The fact that perceived stress approached a significant correlation with EBV antibody titers at time 2, suggests that further data collection may lead to significant results.

Substantial variability was encountered within each condition. For example, some subjects in the experimental and control groups showed increased levels of perceived stress post treatment. This suggests a presence of some additional factors that
account for variability between two conditions. The relationship between stress, EBV titers, and actual health status is still unclear. However this question awaits an examination of a larger sample.

The findings of the study suggest that subjects in the counseling group disclosed significantly more than those in the control counseling group (see Figure 1), which was partially expected, because the essential purpose of therapy is engaging participants into emotional disclosure to resolve their life issues.

Even though previous studies have demonstrated an association between disclosure behavior and EBV antibody titers, those findings should be treated with caution because studies with significant results are more likely to be published than ones with non-significant results (Benschop, Jabaaij, Oostveen, Vingerhoets, & Ballieux, 1998).

It is clear that it is hard to evaluate to what extent emotional disclosure influences immune reactivity (Benschop et al., 1998). We cannot exclude the possibility that personality variables, such as a tendency to disclose psychological information, influenced the ways the subjects completed the questionnaires, and may have indirectly confounded the results of the study.

Limitations of the Study

One of the limitations of this study is that it was difficult to guess the underlined motivation that the participants had when they signed up for the study. Ideally, we wanted to recruit people who wanted to participate in therapy because of their psychological issues, rather than students who simply wanted extra credit. In addition, we
were also unable to verify how much the participants disclosed during the counseling sessions. We could only measure the extent of their disclosure based on their self-report. This suggests another methodological concern that there was no appropriate measure used to examine how much people disclosed and how genuine they were.

Another limitation of this study is a small sample size, and that the majority of the participants were women. This makes it difficult to generalize results across population.

The results of the current study are also limited by the difference of treatment that the counseling and control counseling groups were undergoing. Participants in the control counseling group talked about things that they liked, versus people in the counseling group, who talked about emotionally distressing and traumatic experiences.

Implications and Ideas or Future Research

As mentioned previously, this study is unique, because it draws a link between psychological counseling and immunological outcomes. This study opens up the possibility for future research in this area. Studies with a much larger sample would help researchers gain more significant results.

There are still several important questions to be explored. First, while the findings of the study are limited to the healthy undergraduate students who had no clearly identified diseases, the relationship between emotional disclosure in psychological counseling and health benefits appeared non-significant. Perhaps people with more severe health problems, undergoing high emotional distress due to their illness, may show more immunological benefits, and psychological counseling may have an important
effect on their health (Lutgendorf, Antoni, Kumart, & Schneiderman, 1994). Second, would immunological benefits be more likely to be encountered if subjects undergo therapy with experienced professional counselors versus MFT trainees? Third, can a longer course of intervention produce better immunological outcomes?

In summary, in the presented study, no significant relationship between psychological counseling and immunological outcomes was observed. Previous studies have demonstrated effects of emotional disclosure on EBV antibody titers (Estreling et al., 1993, 1994). Further investigations are necessary to better evaluate under what conditions psychological interventions influence immune control of latent EBV. We would expect future findings to open a new vision on the complex construct of health, and consequently result in a more affective application of various psychological techniques.
REFERENCES


CONSENT TO PARTICIPATE IN A RESEARCH STUDY
CALIFORNIA STATE UNIVERSITY, CHICO

Investigator’s Name, Department, E-mail: Michael Ennis, Ph.D., Department of Psychology, mennis@csuchico.edu

PURPOSE

You are being asked to participate in a study looking at how people’s health changes when they undergo psychological counseling. Specifically, we’ll be looking at antibodies, which are part of the body’s response to foreign invaders. Looking at the body’s antibody response changes over time provides a measure of how well the immune system is working.

PROCEDURES

If you decide to volunteer, you will be asked to present at the Aymer J. Hamilton Building, room 108, on two different days:

1) The first day of the experiment will be close to the first day of your counseling sessions. You will be given some brief demographic, personality and health questionnaires and contribute a blood sample from the vein in your arm. This portion of the study will take about 40 minutes.

2) Soon after the end of your counseling sessions, you will be asked to contribute another blood sample and complete some brief questionnaires. This portion of the experiment is expected to take about half an hour.

BENEFITS AND RISKS

There is no cost to you beyond the time and effort required to complete the procedures described above. Drawing blood may cause discomfort and possible bruising on the arm. All blood samples will be collected by certified phlebotomists.

CONFIDENTIALITY

Blood will only be assayed for antibodies.

Scientific information obtained from this study may be reported at scientific meetings or published in scientific papers, but data from each individual will be combined in averages and other statistics and your name will never be mentioned. With regard to study records,
their confidentiality will be maintained to the fullest extent possible. The data will be analyzed by code numbers and the association between the code numbers and people’s names will be destroyed. Study records will be kept in a locked file cabinet at the California State University, Chico campus and on computers protected by strict security measures.

EMERGENCY CARE AND TREATMENT FOR INJURY

If you are injured as a direct result of research procedures, you will receive reasonably necessary medical treatment at no cost. California State University does not provide any other form of compensation for injury.

RIGHT TO REFUSE OR WITHDRAW

You may refuse to participate in this study. Furthermore, you may change your mind about being in the study and quit any time after the study has started.

INVESTIGATOR’S DISCLOSURE OF FINANCIAL INTEREST IN THE STUDY

The principal investigator does not have any personal financial interest in this research study.

QUESTIONS

If you have any questions about this research project or if you think you may have been injured as a result of your participation, please contact Dr. Michael Ennis at (530) 898-4963 or mennis@csuchico.edu. If you have any questions regarding your rights as a research subject, please contact the Office of Research and Sponsored Programs at Bldg 25, CSU, Chico, CA, 95929; Tel: (530) 898-5700.

CONSENT

YOUR SIGNATURE, BELOW, WILL INDICATE THAT YOU HAVE DECIDED TO VOLUNTEER AS A RESEARCH SUBJECT AND THAT YOU HAVE READ AND UNDERSTOOD THE INFORMATION PROVIDED ABOVE.

Signature of Participant and Date
APPENDIX B
OVERALL HEALTH MEASURE

Are you currently using any prescription medications, including antibiotics?
    yes    no

Have you used any prescription medications, including antibiotics, in the past 30 days?
    yes    no

Have you used any anabolic steroids (for example, cortisol or prednisone) in the past six months?
    yes    no

Have you had any physical or mental illness in the past three months?
    yes    no

Do you have any chronic physical or mental illness, including those currently in remission?
    yes    no

Except for normal acne, have you ever had a skin disorder (for example, psoriasis or eczema)?
    yes    no

If female, are you pregnant, or plan to become pregnant in the next two months?
    yes    no

Do you use tobacco products (such as smoking cigarettes)?
    yes    no

If you do use tobacco products, how much do you typically use per week (for example, how many cigarettes per week do you usually smoke)? ________________
Do you drink alcohol?
   yes  no

If you do drink alcohol, how many drinks do you typically have per week? ______

Do you recreationally use drugs?
   yes  no

Are you currently undergoing psychotherapy?
   yes  no

Do you currently have, or have had in the past 30 days, any of the following:
   fever?    yes  no
   drowsiness?    yes  no
   sore throat?    yes  no
   mouth cankers?    yes  no
   nasal congestion?    yes  no
DEMOPGRAPHIC QUESTIONNAIRE

Name:________________________________________________________________

Today’s Date: _______________________________

Age: __________________________

Sex (circle one):  male   female

On average, how many calories do you eat each day? If you don’t know the how many calories you usually eat, please describe what you eat on a typical day and how much.________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

On average, how many hours of physical activity do you engage in per week? This includes things such as walking and bike riding.______________________________________________

On average, how many hours do you sleep each night?______________________________________________

What is your weight and height?______________________________________________

Are you currently in a romantic relationship (i.e., have a boyfriend, girlfriend, or spouse)?

yes  no
If you are in a romantic relationship, how long have you been in this relationship?

________________________________________________________________________

What day and time are your weekly counseling sessions?

________________________________________________________________________

When is today’s blood draw happening in relation to your first counseling session? For example, you might say, “Today’s blood draw is 2 days before my first counseling session,” or, “Today’s blood draw is the day after my first counseling session,” etc.

________________________________________________________________________

________________________________________________________________________

To make sure that everything is running smoothly though the study, we’d like to contact you periodically. We would appreciate it if you would give a phone number (preferably your cell phone number) that you can be easily reached at. Your number will be confidential and contacts will be very brief check-ins.

________________________________________________________________________

If you are not in the control group, we would appreciate it if you did not tell your counselor that you are participating in this research. This is to help ensure that all of his or her clients are being treated the same way. However, if you do want to tell your counselor that you are participating in this research, no one can stop you from doing so. Therefore, we would appreciate it if you would sign the following statement, but it is not required.

“I agree that I won’t tell my counselor that I am participating in the research project to understand the health effects of psychological counseling.”

Signed: ____________________________________________________________