Psychological sub-types among persons with HIV infection: an empirical study

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Abstract Cluster analysis was utilized to derive sub-types from a group of 53 males with HIV infection based on scores from several psychological measures. Measures administered included the Beck Depression Inventory, Life Orientation Test, Rosenberg Self-Esteem Test and the Internal Control Index. Three sub-types were identified: (1) average performing sub-type (2) severely dysfunctional sub-type, and (3) highly adaptive sub-type. All three sub-types showed different levels and patterns of test performance. Results are discussed in terms of sub-type characteristics and potential treatment issues.

Introduction

Cluster analysis is a family of procedures used to identify homogeneous sub-groups within a sample. The knowledge that distinct sub-types exist may prove useful by providing clarity to complex and inconsistent research findings. The use of cluster analysis to derive sub-types has previously been utilized in HIV prevention (Mulry et al., 1997) and intervention studies (Williams et al., 1998). However, the application of cluster analysis to persons already infected with HIV has been rather limited. Van Gorp et al. (1993) identified three sub-types from a sample of HIV-infected males each with a different pattern of neuropsychological test performance. A study by Jenkins and Patterson (1998) derived four sub-types that differed in levels of locus of control. They noted that these sub-types also differed on mood, anxiety levels and adaptation to disease (Jenkins & Patterson, 1998). A limitation of this study was the examination of only locus of control differences instead of a wide range of psychological variables.

The application of cluster analysis to this population is warranted due to the prevalent inconsistency found in most research studies. Variables such as depression, optimism, self-esteem and internal control are all areas where cluster analysis may prove useful. This inconsistency is evident in the area of depression and HIV infection. For example, some studies found evidence of depressive symptoms (Dickey et al., 1999; Kirkorian & Wrobel, 1991), while others reported minimal levels of depression (Hinken et al., 1992; Joffe et al., 1986; Rabkin et al., 1993). In addition, optimism may have different psychological and health related functions depending on HIV group membership (Taylor & Brown, 1988; Taylor et al., 1992). Research on locus of control has shown that there are differences across sub-types of persons with HIV infection which may be related to disease adaptation (Jenkins & Patterson, 1998). Furthermore, research studies examining levels of self-esteem also show...
this pattern of inconsistency (Lang, 1991; Lima et al., 1993). Clearly, due to the complexity associated with HIV infection, other methods for assessing and exploring this population are needed (Van Gorp et al., 1993).

The goal of this study was to identify sub-types of persons with HIV infection from several psychological measures that appear to be important in adaptation and functioning with the disease. The search for sub-types within the HIV-infected population could provide clarity to existing research by identifying distinct sub-groups that have different psychological characteristics. In this study, depression, self-esteem, internal control and optimism will be examined with cluster analysis as these variables represent major constructs in the study of HIV infection and cover a broad range of psychological functioning.

Methods

Participants and measures

Participants included 53 males who were confirmed HIV-positive by documented proof of reactive ELISA and Western Blot blood tests obtained from medical records. Participants were selected from a state-funded HIV service agency and recruited by case managers who worked directly with this population. All subjects completed a research packet containing a consent form, a demographic and social functioning questionnaire, the Beck Depression Inventory (BDI; a self-report measure of depressive symptomatology with two sub-scales—emotional and somatic; Beck & Steer, 1987), the Life Orientation Test (LOT; a measure of dispositional optimism; Scheier & Carver, 1985), the Rosenberg Self-Esteem Test (Rosenberg, 1965) and the Internal Control Index (ICI; a measure of internal control; Duttweiler, 1984). Current T-cell count was collected from medical records based on blood test results within four weeks of participation. The average age and education level of the participants was 34.6 (7.3) and 12.9 (1.9), respectively. Average length of HIV infection was 51.8 (41.3) months. Forty-three per cent of the sample was diagnosed with AIDS (CDC, 1992), and the average T-cell count was 268 (188).

Statistical analyses

The Beck Depression Inventory emotional and somatic sub-scales, Life Orientation Test, Internal Control Index, Rosenberg Self-Esteem Test and T-cell count were used in the cluster analysis. Cluster analysis was designed to uncover the underlying structure from a set of variables and organize them into homogeneous sub-groups (Diekhoff, 1992). Data were analyzed using the agglomerative hierarchical clustering method which identified clusters of increasing size at each step in the procedure (Diekhoff, 1992). Because this cluster method is affected by scores with different ranges, all scores were transformed into standard Z scores (Diekhoff, 1992). To assess differences across the clustering variables, an ANOVA was conducted. In order to evaluate the stability of the cluster solution, a split-half replication procedure was performed.

Results

A three-cluster solution was chosen because it had the best statistical (agglomeration schedule) and clinically relevant properties than any other number of cluster solutions
Sub-types of HIV infection (BDI emotional and somatic sub-scale scores reversed for clarity). Sub-type 1 ■; Sub-type 2 ●; Sub-type 3 ●.

(Diekhoff, 1992). The test performance and T-cell counts of the three sub-types are shown in Figure 1. The mean scores in the original units of each test can be found in Table 1. ANOVA results revealed that all three sub-types were significantly different \( (p < 0.0001) \) on the measures with the exception of T-cell count \( (p = 0.92) \).

<table>
<thead>
<tr>
<th>Variable</th>
<th>HIV sub-type</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>29</td>
</tr>
<tr>
<td>BDI Emotional</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>8.4</td>
</tr>
<tr>
<td>SD</td>
<td>5.0</td>
</tr>
<tr>
<td>BDI Somatic</td>
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<tr>
<td>M</td>
<td>8.7</td>
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<tr>
<td>SD</td>
<td>3.6</td>
</tr>
<tr>
<td>ICI</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>105.7</td>
</tr>
<tr>
<td>SD</td>
<td>13.1</td>
</tr>
<tr>
<td>Rosenberg Self-Esteem</td>
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</tr>
<tr>
<td>M</td>
<td>30.6</td>
</tr>
<tr>
<td>SD</td>
<td>4.2</td>
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<tr>
<td>LOT</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>17.4</td>
</tr>
<tr>
<td>SD</td>
<td>4.0</td>
</tr>
<tr>
<td>T-cell count</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>274.2</td>
</tr>
<tr>
<td>SD</td>
<td>210.3</td>
</tr>
</tbody>
</table>

*All three sub-types differ, \( p < 0.0001 \).
Sub-type 1: average performing sub-type (n = 29)

This was the largest sub-type, with 54% of the participants assigned to this group. Persons in this sub-type produced scores within the expected ranges on most of the tests, except for a slight elevation in depression scores, indicating mild depression. The individuals in this group probably would not come to clinical attention and appear quite adaptive.

Sub-type 2: severely dysfunctional sub-type (n = 13)

Persons in this sub-type represented 24% of the sample. These persons are characterized by a severely dysfunctional test performance profile. Demographically, these are persons who have been infected for the shortest amount of time (M = 34.9 months) and 70% report living alone. Perhaps these are persons who are having a difficult time adjusting to the disease. Tests results show both the emotional and somatic components of depression are high. Scores on the LOT suggest that pessimism is very high and motivation toward treatment could be low (Carver et al., 1989). This could result in a distancing from goals and focusing on stressful events (Scheier et al., 1986). Persons in this sub-type could be difficult to motivate, and are possible candidates for programme dropout or non-adherence to treatment interventions (Carver et al., 1989). Finally, persons in this sub-type may also be vulnerable to rapid disease progression and a shortened life span (Aspinwall & Taylor, 1992; Laviena, 1992).

Sub-type 3: highly adaptive sub-type (n = 11)

Persons in this sub-type are classified as highly adaptive and represent the smallest portion of the sample (22%). Demographically, these persons have the most education (M = 13.8 years), have been infected with HIV the longest (M = 59.1 months), and have the lowest T-cell count of the sub-types (M = 247.4). Surprisingly, 63% of these persons live alone. This group is the opposite of the severely dysfunctional sub-type in relation to profile characteristics. Persons in this sub-type exhibit high levels of optimism, self-esteem, internal control and a low level of depressive symptoms. This pattern of test performance could be interpreted as an over-adaptation to the disease by enhancing good mental health (Taylor & Brown, 1988). Optimistic and positive, this group possibly represents those persons who seek social support and engage in more active coping through problem-focused intervention and goal directed behaviour and persistence (Aspinwall & Taylor, 1992; Carver et al., 1989; Taylor & Brown, 1988; Taylor et al., 1992). Persons in this sub-type could exhibit better physical health and a faster recovery from disease (Scheier & Carver, 1987; Scheier et al., 1989). Based on the adaptive nature of their profile, persons in this sub-type could be good candidates for long-term survival.

In order to evaluate the stability of the three-cluster solution, a split-half replication (i.e. cluster procedure applied to one-half of the sample at a time) was conducted (Morris et al., 1981). Overall, 85% of persons were correctly placed in their original cluster. This classification percentage is comparable to other sub-type analyses with the HIV population (Van Gorp et al., 1993). Based on these results, the cluster solution appears stable.

Discussion

Cluster analysis can be used to identify homogeneous grouping of individuals with similar characteristics. In this study, three distinct sub-types were identified and described based on
their psychological test performance. The three sub-types described differ on levels of depression, optimism, locus of control and self-esteem. Based on test scores, the sub-types could be linked to differences in treatment outcome and overall adjustment to the disease. Also, the sub-types derived in this study were not related to differences in T-cell count and seem to encompass a wide range of individuals.

The sub-types found in this research are similar to sub-types found in previous research (Jenkins & Patterson, 1998; Van Gorp et al., 1993). In these studies, there appears to be one sub-type that performs poorly (Sub-type 2) and another sub-type that performs above average (Sub-type 3) on the measures. The sub-types in this study show a similar pattern, and it is encouraging that with different measures and methods some degree of consistency in sub-type performance was obtained. The identification of sub-types of HIV-infected persons is important for several reasons. First, previous research examining group differences are often equivocal and inconsistent. The identification of sub-types could be responsible for these differences. Thus, broad conclusions about persons with HIV infection may be precluded by sub-types which show different patterns of performance. Second, a sub-type approach can be used to look for differences in treatment response. If consistent sub-types emerge, one can examine how these sub-types respond to treatment. In essence, a cluster solution is useful if it provides information about sub-types that results in enhanced identification and treatment.

Limitations of the study include a moderate sample size. Increased numbers of persons infected with HIV would promote greater stability and more confidence in the sub-types. Furthermore, this study examines only the performance of males and may not apply to females in this population. Future research should be aimed at the further development, validation and refinement of sub-types of HIV-infected persons. A wide variety of measures should be utilized and relationship of sub-types to other variables (medical and social) should be pursued to explore sub-type parameters.

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References


