

Social representations and applied sciences: the case of HIV prevention

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Abstract

The study of the diffusion of scientific knowledge on aids from the perspective of social representations takes an important role in the socialization of knowledge generated by science about the illness. The experimental and survey studies reported in this article focused on the influence of media, social interaction and different forms of diffusion of scientific knowledge about HIV/Aids on the informative dimension of social representations, summarizing research conducted by the Social Psychology of Communication and Cognition Laboratory (LACCOS). Results indicated that providing conditions for the individual to receive the message and giving him/her the possibility to have a position of towards it is fundamental for the acquisition of attitudes and knowledge that favor prevention practices. This implies promoting interaction between scientific and consensual representations in the frame of actions directed to the scientific popularization of aids.

Keywords: Social representation, Knowledge, Aids, Scientific diffusion.

Representações sociais e ciências aplicadas: o caso da prevenção do HIV

Resumo

O estudo da divulgação do conhecimento científico da aids, a partir da perspectiva das representações sociais, assume um papel importante na socialização dos conhecimentos gerados pela ciência sobre a doença. As pesquisas experimentais e de levantamento de dados que serão relatadas neste artigo focalizaram na influência da mídia, da interação social e das diferentes formas de divulgação do conhecimento científico sobre o HIV/Aids na dimensão informativa das representações sociais, sintetizando uma linha de pesquisa do Laboratório da Psicologia Social da Comunicação e Cognição (LACCOS). Os resultados indicaram que proporcionar que o indivíduo receba a mensagem e possa se posicionar frente a ela é fundamental para a aquisição de conhecimento e atitudes favoráveis a práticas preventivas. Isto implica promover uma interação entre as representações científicas e as representações consensuais no quadro de ações de popularização científica da aids.

Palavras-chave: Representação social, Conhecimento, Aids, Divulgação científica.

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Aids is one of the most stigmatizing illnesses of humanity history. Since its emergence in Western societies, in 1981, it has represented much more than just a disease, fast becoming a phenomenon (Sontag, 1993). What in the beginning was just a convention to designate an illness soon acquired a life of its own in the imaginary of the population. The acronym "AIDS" (Acquired Immunodeficiency Syndrome) soon got transformed into a noun in Brazil: aids, and also became the symbol of a new social representation that develops itself in the course of communication by means of a composition of scientific and popular knowledge, according to Moscovici (2003).

According to the World Health Organization (2005) there was no epidemic in the last 50 years that was more severe than aids, which gave it the status of pandemic. The HIV/AIDS epidemic has hit all segments of society, regardless of socioeconomic conditions. In contrast with other illnesses, the media presents aids as an evidence of decay and degeneration. Due to the social meanings linked to the epidemic, the HIV produces social limitations mainly based upon the silence and invisibility of seropositive people. Discrimination and stigma go beyond the borders established by cultures, languages and sexualities. In countries all over the world there are well documented cases of people who live with HIV whose rights to health services, work, education and freedom of movement have been denied. An international review of the impact of the stigma of the pandemic evidences its combination with other stigmata like those associated with disease, poverty, gender, social class and nationality (Diaz & Toro-Alfonso, 2007).

According to the statistics, 26 million of the 42 million people infected with HIV in the world are between 15 and 49 years of age (WHO, 2009). In Brazil, 544.846 cases of people with aids were registered from 1980 to June 2009. A proportion of 65% of those cases were male. The southern region of the country concentrates 19,21% of the notified cases, and the state of Santa Catarina was the second in terms of the incidence of aids by 100 thousand inhabitants in the year of 2009, with 33 new cases (Ministério da Saúde Brasil, 2010).

The research team of the Social Psychology of Communication and Cognition Laboratory (LACCOS) has been characterized by the investigation of the impact of different

forms of scientific knowledge communication concerning HIV/Aids on the social representations about the illness, mainly on their information dimension. The studies were conducted in the state of Santa Catarina, in the south of Brazil. The results contribute to the planning of public policies directed towards the prevention of populations with diversified profiles concerning HIV/Aids contagion, sketching strategies with higher probability of efficacy. We will present a synthesis of the most recent studies carried out by LACCOS relative to advances in the understanding of the relationships between scientific knowledge diffusion about HIV/Aids, social representations and the knowledge about the illness.

Social representation on Aids

With over two decades of coexistence with the aids epidemic, society considers it a big health problem, loaded with doubts, many of which are deprived of responses, and tries to organize itself to attribute meanings and formulate concepts to learn how to live with the impact and psychosocial repercussion generated by the illness (Silva & Abrantes, 2004).

The threats and mysteries that came around with the emergence of the social phenomenon of aids can trigger a process of theory elaboration – in individual and collective spheres – that combines values, beliefs, attitudes and information. It is by means of the study and diffusion of those theories that an individual organizes a coherent view of the object and of itself in the world, at the same time that s/he aims at negotiating a space of acceptance and inclusion related to the groups with which s/he interacts (Tura, 1998).

Social representations operate by making it possible to understand reality: by means of the construction of representations on specific aspects of reality, groups and cultures establish and isolate their products (ideologies, practices, beliefs) from external influence. As an example, the representation on aids as divine punishment legitimates the discrimination against homosexual men (Bangertner, 2000).

Camargo (2003) has identified a scheme thoroughly shared by secondary school students in France when he studied the social representations on aids prevention: the idea that the complicating element for preservative use

was the boy and the cautious element was the girl, since the former refused to make use of protection while the latter demanded it. This way of thinking the use of preservatives did not have a correspondence in the context of social behavior, but had force and a consensual existence; it was important in the 90's and brought consequences for the prevention of aids epidemic.

For the structural approach of the social representations phenomenon, this modality of knowledge is constituted by a set of beliefs, opinions, attitudes and information about a given social object. That information is organized around a structure with hierarchical elements, in a central core (Abric, 1994, 1998). The peripheral elements are organized around this core; they are the most concrete, accessible and lively elements. Flament (1994) attributes a behavior prescription function to the peripheral elements, pointing out to the subject how to act spontaneously in a given context. The central core generates meaning to the other elements, and organizes them in a relatively stable structure.

In the 90's, studies about the structure of the social representation on aids demonstrated the centrality of the elements *sex*, *illness* and *death*. The idea of a mortal disease that is related to sexual life, while a paradox, was prevalent and organized the understanding of common sense about HIV/Aids. Morin and Vergès (1992) observed this double centrality of *death* and *illness* in the social representations of teenagers from France and Belgium on aids.

Tura (2004) has observed that the following elements: *death*, *sex*, *condom* and *illness* composed the central core of the representation of a population of young people ranging from 14 to 18 years old from Rio de Janeiro, while *risk group*, *contamination*, *recklessness*, *loneliness*, *care*, *desperation*, *solidarity*, *cure*, *weakening* and *hospital* were the ones that formed the peripheral system of the social representation on aids.

In a study with Brazilian university undergraduates almost ten years after Morin and Vergès' (1992) study, Camargo (2000) observed that the main central elements of the social representation on aids were *sex* and *prevention*, among others, characterizing the relationship of aids with the notion of sexual prevention. This change in the social representation seems to be related to the intense attention from the media about the prevention

of the disease as the only form of protection. Prevention actions in schools also seem to be related to this change in the social representation about the epidemic.

A more recent study (Camargo, Barbará, & Bertoldo, 2007) with students from the same age range of Tura's (2004) research, but from the city of Florianópolis, pointed out the elements *death*, *illness*, *sex*, *preservative* and *prevention* as central and *prejudice*, *fear*, *sadness* and *drugs* as peripheral ones. Although high connectivity was observed between *illness*, *death* and *sex*, the two elements that introduce the idea of protection – *preservative* and *prevention* also had an organizing role in the social representation on aids.

More recently, Barbará (2007) also carried out a study with secondary school students from Florianópolis and observed that other than the elements *sex* and *illness*, the element *prevention* shows up as central in the social representation on aids. The *death* element is still connected to aids, but in that study it had a peripheral status.

With the passing of time it has been observed that the functional elements that characterized aids as a lethal disease of sexual nature have gained an important element: the fact that it can be prevented. This also brought a normative quality to the elements: *sex* and *preservative*, the dissociation of the threat of the epidemic with a particular type of sex: the protected kind. It could be observed that the social representations on aids, in different groups, demonstrate normative elements as the main characterizing marks, and they point out to emotional components linked to death as central elements of that representation, although that element has been attenuated by the development of antiretroviral therapy.

Knowledge about HIV/Aids

Scientific knowledge is adapted as a new form of common sense, in which groups do not produce a scientific body of knowledge, but re-elaborate it according to their means and knowledge predispositions. Social representations have a fundamental role in the sense that they work to socialize scientific knowledge, introducing it in everyday communication and making of it a part of the realities and lives of people. Mass communication means, allied to the intervention from science, exert influence in the

construction of common sense theories that groups create about a certain object (Moscovici, 1981).

Internal and external processes are involved in the transformation of scientific content into common sense content, according to Moscovici and Hewstone (1986). For the authors, those processes may be called informative thinking and representative thinking, and each of those thinking forms has its own rationality.

Every representation about a scientific theory, physical, psychological, sociological, etc. is situated within common sense and implies deep change in content, as well as cognitive structure. Once made, this change corresponds to a change in the object perception process. In the case of aids, scientific contents about the illness become familiar and part of the everyday lives of individuals, because science is a part of the view of everyday life, being inseparable from social relations. However, its reorganization involves different criteria from the ones employed by the scientist, that is: the reduction of elements from the object serves practical purposes in everyday life. One of these purposes, as signals Wagner (2007), is the fact that these metaphoric and iconic representations of scientific facts work as acceptable and legitimate beliefs in conversation with other people.

Studies point out to a relationship between knowledge and preventive behavior (Almeida, Silva, & Cunha, 2007); however, there are also other significant variables in the adoption of preventive practices (Camargo & Bertoldo, 2006; Camargo & Botelho, 2007; Trajman et al., 2003), such as affective commitment with the partner and having school as the main information source rather than television, among others.

Martins, Nunes, Muñoz-Silva, and Sánchez-García (2008) have investigated the knowledge of Portuguese and Spanish undergraduates about HIV transmission and prevention (N = 678) and have observed that, although knowledge was high for the two participant groups with different nationalities—over 79% of correct responses—, the level of correct answers was higher among the Portuguese than among the Spanish. In a study conducted in the United States for the construction and validation of a knowledge test about the aids virus, Carey, Morrison-Beedy,

and Johnson (1997) have verified that the level of knowledge about this topic increased with the increase in school years.

In a study with 1.386 secondary school students in Santa Catarina, Camargo and Botelho (2007) observed that over 90% of the students knew the ways of transmission and prevention of HIV. Still, more than 30% of them made mistakes when incorrect transmission means were added, such as blood donation or the use of public restrooms. This lack of knowledge was linked to the fact that most students had friends as main information sources.

Most studies that evaluate knowledge about aids focus only correct and incorrect vectors in HIV transmission (Camargo, Botelho, & Souza, 2001; Marquet, Zantedeschi, & Huynen, 1998), i.e. the instruments for the measurement of knowledge on aids have focused basically the pragmatic dimension of knowledge about the disease, mainly its transmission forms and the use of preservatives. This observation has led Camargo, Barbará, and Bertoldo (2005) to elaborate a measurement instrument that evaluates more global knowledge of the contents about the topic, since knowledge on HIV/Aids involves also information about biology, infectology and treatment.

Departing from the official publication of the Pasteur Institute, coordinated by Montagnier (1996), 36 items evaluated by 15 HIV/Aids specialists were elaborated. The experts completed the test, suggested changes and estimated the percentage of people that would answer each question correctly in a population of secondary school young people that was scientifically well informed (referee technique). The result of this procedure was a set of 24 items that had to be evaluated as being true or false. The items constituted 3 sub-tests, according to the classification proposed by the publication: 1) the Aids virus and its transmission 2) HIV infection and its treatment and; 3) prevention (Camargo, Barbará, & Bertoldo, 2005). This Test of Scientific Knowledge on HIV/Aids (TSKHA¹) was administered in 262 public school students from the city of Florianópolis, with mean age of 17 years and 8 months; 56,9%

¹ To obtain the items of the TSKHA in Portuguese or English, contact the corresponding author.

were female and just 45% of the sample was considered well informed.

Another more recent study, conducted in Brazilian and French suburban schools, employed only the first sub-test of the TSKHA, the one about the Aids virus and its transmission (Giacomozzi, 2008). The Brazilian participants had a mean of 5,80 correct answers (standard deviation 2,04) within 10 possible ones, while the French had a mean of 4,96 (standard deviation 2,16). The difference was statistically significant [$t = 4,34$; $df = 476$; $p < 0,001$]. Those means are below the cut-off point of 7, indicating that both in Brazil and in France that type of participant did not present the minimally expected performance in terms of scientific knowledge about HIV and its transmission.

Also aiming at taking the global knowledge on HIV and aids into account, Natividade (2010) developed a test with 85 items to assess the level of scientific knowledge of people older than 18 years of age about HIV and aids. For that purpose, he has decomposed the knowledge on HIV and aids in six theoretical dimensions that described the theme: 1 – Aids and HIV description; 2 – History of the illness and HIV; 3 – HIV contagion and prevention forms; 4 – Aids symptoms and HIV functioning; 5 – Aids treatment and HIV control; 6 – Epidemiology. There were 480 participants with ages ranging from 18 to 63 years ($M = 25,44$ years; $SD = 8,25$ years), 67,7% were women. The mean of correct responses of the participants was 49,03 points ($SD = 10,86$ points; *Median* = 50 points).

There were no differences of scientific knowledge level about HIV/aids between the sexes [$t(478) = 0,63$; $p = 0,53$]. In that study the participants had a mean of 57,6% of correct answers (total number of items = 85), which indicates unsatisfactory scientific knowledge about HIV/Aids.

Table 1 shows that the lowest mean proportions were verified in the items about the history of the illness and epidemiological indications, while the items about contagion and prevention forms were those with proportionally more correct responses.

Knowledge, communication and aids prevention

The presence of social communication means is becoming more intense in lifestyle nowadays, especially concerning the circulation of objects of social debate, and particularly in terms of the diffusion of information about the aids epidemic (Camargo, 1997). The high rate of aids notification cases, mainly among the young, was one of the reasons that led the researchers from LACCOS to question the form with which the knowledge about the illness is being diffused. It seemed as if just transmitting preventive information, without interaction between receptors and a more active relationship on their part with the means of transmission of such information, was a form of reduced preventive effectiveness.

Table 1 - Scores and proportions of correct responses for each dimension of the test of scientific knowledge on HIV/aids.

Dimension	Score in the dimension (points)	Mean proportion of correct resp. (%)
1. HIV and aids Description (7 items)	$M = 4,37$; $SD = 1,40$; $Min = 0$; $Max = 7$	62,43
2. History of the illness (7 items)	$M = 1,67$; $SD = 1,33$; $Min = 0$; $Max = 6$	23,86
3. HIV contagion and prevention forms (32 items)	$M = 20,28$; $SD = 4,26$; $Min = 8$; $Max = 31$	63,38
4. HIV symptoms and functioning (26 items)	$M = 15,54$; $SD = 4,33$; $Min = 3$; $Max = 25$	59,78
5. HIV treatment and control (8 items)	$M = 5,43$; $SD = 1,40$; $Min = 1$; $Max = 8$	67,88
6. HIV epidemiology (5 items)	$M = 1,73$; $SD = 1,23$; $Min = 0$; $Max = 5$	34,60

Camargo and Barbará (2004) have conducted a study with 300 secondary school students from public and private schools of the cities of Florianópolis, Itajaí and Balneário Camboriú, in the state of Santa Catarina, about the effects of reading informative pamphlets about aids on the knowledge of that illness and on the attitudes towards preservative use. The mean age of the participants was 16 years and 3 months. Half of the participants (150) attended night-shift public courses and the other half had daytime classes in private schools; there were 75 male and 75 female students. Of the 75 students of each sex and school, each 25 read a type of pamphlet (A, B or C). The control group was composed by 50 students from a night-time public school of Florianópolis. Three experimental pamphlets were employed, pamphlet A (Adolescence and aids) did not emphasize any means of HIV transmission; B (Adolescence, drugs and aids) linked the transmission of aids to drugs; and C (Adolescence, sexuality and aids) related aids transmission to sexually transmitted diseases (STDs).

The instruments employed in that study were three questionnaires administered in a collective situation, with 7 items about the

knowledge on HIV transmission and a 12-item scale of attitudes towards preservative use (Likert type with 4 points – medium point = 2,5). The first questionnaire was administered before reading the pamphlet, the second one after reading it and the third one 10 days after the first administration. The control group did not read the pamphlets, just completed two questionnaires in times 1 and 3.

To verify the impact of pamphlet type on the knowledge relative to aids transmission (Aids Knowledge Index – AKI) an analysis of variance with a 2x2x3x3 design was employed, in which were taken into account: “gender of the participant” (male and female), the type of school (private or public) the type of pamphlet (A, B or C) and the score relative to knowledge about aids (before reading, after reading and 10 days later).

A difference among the three measures about the knowledge indicator was verified (“time” variable) [$F_{(1, 299)} = 110,20$; $p < 0,001$]. The interaction between “time” and “type of school” also affected significantly the AKI [$F_{(1, 299)} = 7,84$; $p < 0,001$]. And the interaction between “time”, “pamphlet type” and “sex” was significant [$F_{(2, 299)} = 3,30$; $p < 0,05$].

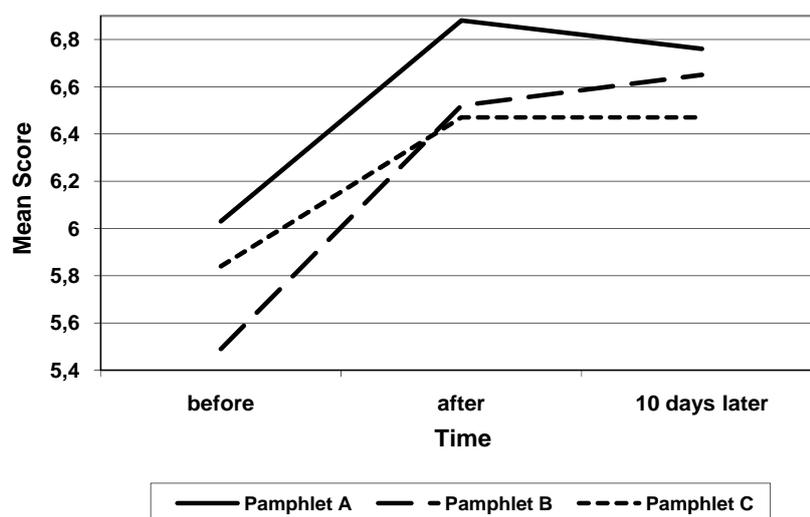


Figure 1 - Short and medium term changes in the mean score of knowledge about aids transmission, as a function of reading the pamphlets in private schools (N= 150).

According to Figure 1, there is a clear increase of the scores relative to knowledge between time 1 (before reading) and time 2 (after reading) for the three pamphlets, among the participants of private schools. The medium term effects (between times 2 and 3) are the ones that differ. The gain in knowledge is slightly higher among those who read pamphlet B, maintained among the ones who read pamphlet C and partially reduced among those who read pamphlet A. However, between the initial and final situation (times 1 and 3) there was always a gain in knowledge, independently of the type of pamphlet, which is very different from what happened with the control group, where there was a reduction of the mean knowledge score, what kept it below 6 points.

According to Figure 2, the comparison of times 1 and 2 among the participants from public schools indicated an evolution similar to the one verified in the private school participants, but with lower intensity. And there was a medium term loss of the positive effect among those who read pamphlet C. The positive impact upon those who read pamphlets A and B was maintained after 10 days.

The results pointed out that the knowledge about aids transmission, in private schools, improved more among the readers of pamphlet

B (Adolescence, drugs and aids) than with the readers of pamphlets A and C. In public schools, though, pamphlet A (Adolescence and aids) obtained more positive effects. The positive impact of pamphlet B was more evident among male participants. For female participants pamphlet A produced better results.

The examined data demonstrate the existence of positive impact of reading the pamphlets on aids knowledge, but there were no changes relative to the attitudes toward preservatives and, in some cases, favorability towards the object was reduced, mainly among the readers of pamphlet C (Adolescence, sexuality and aids).

The gain in knowledge about the topic indicated that the contact with new information adapted to the public that is their receptor becomes relevant as a prevention instrument to be made available to young people. As for the informative material having reduced favorability of the attitude towards the preservative, it is possible that the preventive message stimulated a more realistic assessment, bringing up concern for the young. Anyhow, it is possible to evaluate the use of pamphlets as preventive strategies regarding aids as positive.

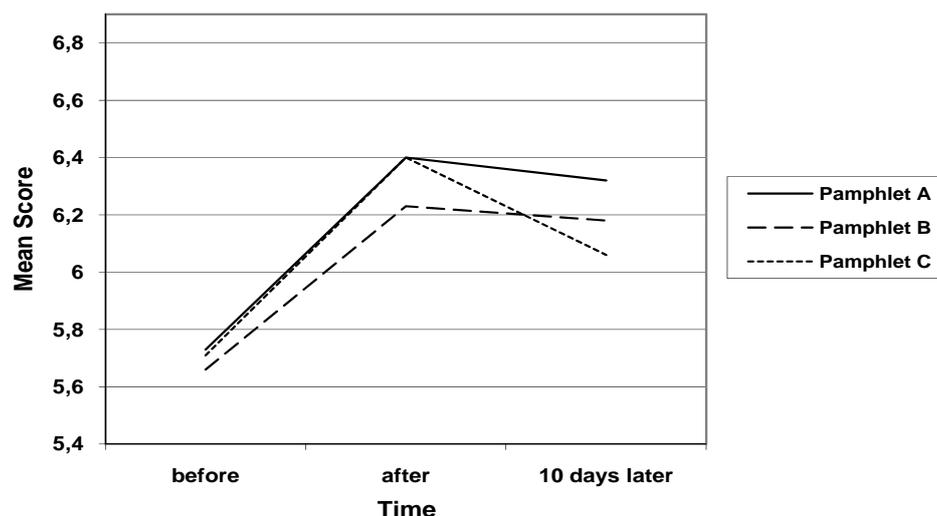


Figure 2 - Short and medium term changes in the mean score of knowledge about aids transmission, as a function of reading the pamphlets in public schools (N= 150).

Informative videos and scientific knowledge about aids

In their study about informative pamphlets Camargo and Barbará (2004) have concluded that video is among the preferred media of teenagers to obtain information, and particularly information about HIV/Aids. Hovland (1954) already stressed that video is an especially powerful means of information diffusion because it employs both visual and audio resources, making the grasping of contents easier.

Therefore, Camargo, Barbará, and Bertoldo (2008), with the aim of verifying if watching informative videos about aids would increase the previous knowledge of the receptors about the epidemic, have conducted a field experiment that assessed the impact of two types of video (scientific and popularized) on adolescents' knowledge about aids (dependent variable). There were 141 teenagers who took part on the experiment, all secondary school students from a public school from Florianópolis. The mean age of the sample was 16 years and 4 months (SD = 11 months), and 56,03% of them were female. The control group was formed by 56 students, while Group 1 (scientific video) was constituted by 46

students and Group 2 (popularized video) by 39 of them.

A self-administered questionnaire and the TSKHA (Camargo, Barbará, & Bertoldo, 2005) were employed in a collective setting right after the videos were exhibited (video 1 – scientific for group 1, video 2 – popularized for group 2, and no video for the control group). After one week, the questionnaires were re-administered in all groups.

Concerning the effects on knowledge associated with the exhibition of each video, the results were favorable to the scientific one (see Figure 3).

Group 1 – scientific video – had a statistically significant difference between the first measure of knowledge and the second one [$t = 3,54$; $df = 45$; $p < 0,001$], as well as an increase in the mean score. Group 2 – popularized video – had an increase on the second measure that was smaller than group 1's, and that increase was not significant [$t = 0,52$; $df = 38$; $p = N. S.$]. As for the control group, the impact of the time variable represented a small, albeit significant reduction in the mean score: 15,86 in time 1 and 15,08 in time 2 [$t = 2,11$; $df = 55$; $p < 0,05$].

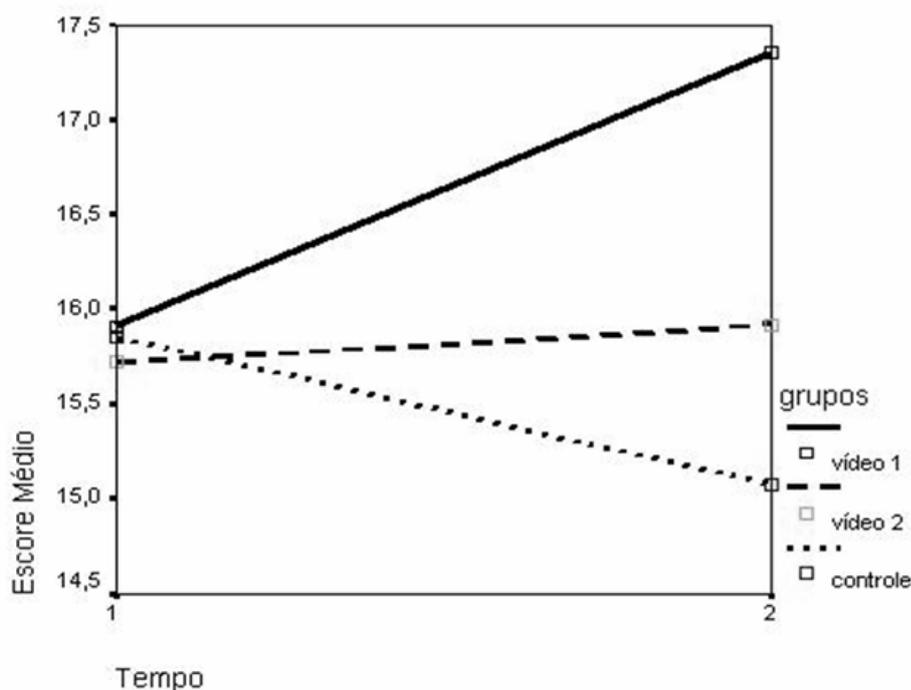


Figure 3 - Mean scores in the TSKHA by experimental condition, before and after the video exhibition.

The experiment could evidence that only the exhibition and understanding of the documentary video with a more scientific content implied a significant increase on the knowledge about HIV/Aids. The amount of information that was conveyed with entertainment purposes, to attract the attention of the young, employing the appeal to emotion

The role of interaction in the acquisition of scientific knowledge about aids

With the aim of enhancing the study of the impact of different forms of diffusion of scientific knowledge about HIV/Aids on the attitudes towards preservative use and the knowledge of the disease, Barbará and Camargo (in press) have carried out research with 478 students of the 2nd grade of secondary school from two public state schools from the city of Florianópolis. For that purpose, two studies were conducted: 1) one about two types of reception of an informative video (active and passive) and 2) another one about a simulated case involving a scientific controversy, in which participants took part of the construction of information itself.

In the first study the sample was composed by 378 students, with a mean age of 16 years and 8 months (SD = 2 years), formed by 51,05% of male participants. A total of 190 of those (50,3%) took part of the group with discussion (active reception); and 188 (49,7%) participated of the group without discussion (passive reception).

The instruments used in that study were two semi-structured and self-administered questionnaires (open-ended and objective questions); the test of scientific knowledge on HIV/aids (TSKHA) (Camargo et al., 2005), and a scale of attitudes towards the preservative (Camargo & Barbará, 2004). The "Risk of Aids in adolescence" video exhibited to the students was produced by LACCOS from a script elaborated by 2nd grade secondary school students from the state education network of Florianópolis, and it is divided in two moments: the first one tells the story of a teenager who is contaminated with the HIV virus through her boyfriend; in the second one, there are speeches of two specialists (an Infectologist and an Epidemiologist) tackling three dimensions of the topic: contamination forms, treatment and prevention.

and persuasion by means of identification – with the use of famous actors and singers – (in the case of video 2) did not imply a significant improvement. In contrast, the scientific quality of information seems to have favored the curiosity of students, generating significant impact associated with the scientific information (video 1).

The focus group technique (Bauer & Gaskell, 2000) was employed for the discussion of the content from the informative video, with the aim of obtaining data about its reception. Each group was formed by five to seven participants and the focus of discussion was the content of the informative video (HIV/Aids).

Two meetings were conducted (Time 1 and Time 2) with each school group, in a time interval of seven days between them. The first meeting (Time 1) had the following steps for the active reception group: introduction of the researcher and of the research to the students, administration of the questionnaire, exhibition of the video and group discussion (duration of 90 minutes). And for the passive reception group the procedure ended with the exhibition of the video (duration of 45 minutes). The second meeting (Time 2) consisted in the re-administration of the questionnaire in all groups.

Concerning the information sources of the participants about aids knowledge, school emerges as the main one for almost all of them (98%). Around two thirds of the participants also indicate that the information was provided by television, magazines and their families.

In terms of the knowledge about HIV/Aids measured by the TSKHA, the participants from the active reception group had a mean in Time 2 (20,88) clearly superior to the one from Time 1 (16,66), and the dispersion of their scores decreased (the initial standard deviation was 2,52 points and became 1,97 in Time 2). In the passive reception group there was also an increase in the mean of correct responses (Time 1: 16,73; Time 2: 18,07), but it was smaller in comparison with what happened in the previous group, and the dispersion remained the same (standard deviation of 2,35 points). The increase in scientific knowledge about HIV/Aids was higher among the participants from the active reception group and presented itself statistically significant [$F_{1,372} = 143,307$; $p < 0,0001$].

The ANCOVA revealed a significant effect of the “time of reception” variable on the second measure of the TSKHA [$F_{1,372} = 143.307$; $p < 0,0001$], with a large effect size (Cohen’s $d = 1,28$). The “sex” variable did not have a significant effect when considered separately [$F_{1,372} = 6,384$; $p = \text{NS}$] or in interaction with the “time of reception” variable [$F_{1,372} = 0,14$; $p = \text{NS}$] on the second TSKHA measure.

Concerning the second study – simulated case – involving a scientific controversy in the experiments about vaccines developed for HIV/aids combat (Martin Godillo, 2001; Bazzo & Pereira, 2005); 100 students took part, distributed in 5 groups with age means of 16 years and 9 months (Standard deviation of two years), 60% of whom were male.

The instruments employed in that study were two semi-structured self-administered questionnaires (the same ones from the video reception study) and a procedure named “simulated case”. This procedure consists in 3 meetings with each group, for three consecutive weeks with the duration of 2 hours each. Data collection took place in class time, and was carried out collectively. A questionnaire was administered on the first day (Time 1) and the other one on the third meeting (Time 2), that is, before and after the simulated case procedure (duration of 30 minutes).

Scientific knowledge in Time 2, after the participation in the simulated case, presented a mean of correct responses much higher (21,3) than the one verified initially (in time 1: 15,92); the dispersion of correct responses among the participants decreased (from an initial standard deviation of 2,73 to 1,69); and the difference of the initial mean of correct responses when compared with the final one presented a statistically significant difference [$t = 17,445$; $df = 99$; $p < 0,0001$].

In the two studies about pedagogic videos (Camargo, Barbará, & Bertoldo, 2008; Barbará & Camargo, in press), the TSKHA was employed in its complete version (24 items). The first one of them focused the content of that kind of material (scientific or popularized); and the second one concerned the type of reception (active or passive) and the participation in the construction of the preventive message (simulated case). However, the differences of the results found in those studies can be stressed when the scores of the first and second measures are taken into

account. In Camargo et al.’s (2008) study the students who watched the scientific video had an increase of 1,25 points in the level of scientific knowledge in comparison with the first measure of the TSKHA, but the popularized video was only associated with an increase of 0,2 points. In contrast, in Barbará and Camargo’s (in press) study the students who took part in the active reception video had an increase of 4,22 of their scores in the first measure, and an increase of 1,32 points in the passive reception video. Those indications point out to the importance of the type of content of pedagogic videos and of the interactivity in the reception of preventive messages with the increase of knowledge about the epidemy. It is important to make it clear that the video produced by the students, although different, is closer to the scientific video than to the popularized ones used in Camargo et al.’s (2008) research, as it also focuses scientific contents presented by specialists from the health field.

It can be concluded that video presents itself as an important means of diffusion of scientific knowledge about HIV/Aids, which might be used more often by actors in the field of aids prevention. However, Camargo et al. (2008) warn that one of the big challenges is to select a suitable and current informative video for that purpose. For the authors, pedagogic videos must spread preventive information in a clear language that is accessible to the students, without overwhelming appeal to the suffering of HIV bearers and people with aids.

The most significant contribution of those studies involves the efficacy of the interaction context in the sharing and grasping of new scientific knowledge on HIV/aids, which can serve as a point of departure for future studies about the diffusion of scientific knowledge about HIV/aids and the interaction in the phase of elaboration and reception of preventive messages involving the adolescent age range. In addition, those studies attest the efficacy of the two diffusion means of scientific knowledge (reception of pedagogic videos and simulated case) in the sophistication of knowledge of the students about the epidemic.

Once that the participants of an interaction establish a relationship of communication with a better cognitive construction, it is necessary that they occupy themselves with topics with a complexity that is adequate to their cognitive level, yet at the same time becomes

progressively more complex (Ghiglione, 1990). For Clermont (1994), the full development of individuals is based on the construction of knowledge, i.e., on the intrinsic motivation of a task, on the intensification of communication and on the interaction of participants. To favor and to stimulate the interactivity of the public in face of messages involving science and technology topics has been the desired way for science diffusion centers such as museums, fairs and exhibitions. This is also evidenced by computer networks, by articles in knowledge diffusion magazines and specialized columns.

Humanity has always created forms of diffusing the knowledge that it has produced by making use of educational practices. One of the components of knowledge is the scientific and technological one, in which schools and communication means are responsible for the role of diffusion (Shamos, 1998). Scientific diffusion consists in communicating, through the large public, the results of scientific and technical research and, more often, the set of productions of scientific thinking, producing messages that can be assimilated more easily (Askevis-Leherpeux, Leyens, & Drozda-Senkowska, 2000; Schiele & Jacobi, 1989).

The interest of the large public, i.e., population in general, by science and technology manifests itself particularly by means of an increase of the consumption of cultural products related to scientific and technical knowledge, which is usually grouped under the expression scientific popularization. The outbreak of magazines and journals dedicated to the presentation of results from scientific works and the examination of its repercussions attest the extension of popularization practices and the diversification of communication strategies (Schiele & Boucher, 1989). It is believed that working the relationship between scientific contents and their application, technological development and its social and environmental impact (society) might be an effective strategy of prevention both in terms of environmental risk and health risk, as in the case of the aids epidemic.

Social representations, scientific knowledge and communication about aids

Representations are transformed in communication, by means of reciprocal

influences among individuals, through implicit negotiation in the course of conversation, in which people guide themselves to shared symbolic models, images and values. In this process, people acquire a common repertoire of interpretations and explanations, rules and procedures that can be applied to everyday life. But far from being passive receptors, people and groups think on their own, produce and communicate unceasingly their own and specific representations and solutions (Moscovici, 2003).

Therefore, within social representations theory, the media possess an essential role since they act on the production and conveying of social representations when knowledge produced by science is popularized to the lay person. It is important to stress, according to Bauer (1994), that this passage from science to common sense does not take place in a single direction, but it is rather two-directional, transforming topics from common sense into scientific ones (ascending flow) as well as transforming scientific knowledge into common sense (descending flow). The diffusion of ideas in the descending direction constitutes a form of popularization; the diffusion in ascending direction is a form of scientificization.

Social representations constitute a category of common sense. They are hybrid products formed from the capture on the part of lay people of the specialized discourse diffused by media. This scientific discourse is transformed in its diffusion by the media and in conversation and social interaction. The transformation of meaning takes place when groups get in contact with new and unfamiliar ways of thinking. Due to the threat of those new ways for collective identity, members of a group or culture are motivated to communicate with one another about those ideas or concepts, and anchor them in a shared social reality (Bangerter, 1995; 2000). Those processes constitute an important aspect of current culture, where discourse produced by specialized sources has shifted from many of its authoritarian sources of knowledge, like religion, and performed an important role in the validation of beliefs, thoughts and the regulation of social practices (Bangerter, 2000).

Social representations theory (Moscovici, 1981) has contributed to the understanding of how the acquisition and sharing of knowledge

of different kinds are processed, above all focusing the relationship between specialized (scientific) content and common sense content (social representations). Camargo, Barbará, and Bertoldo (2007), when investigating the relationship between the representation field dimension, by means of the diagnosis of the structure of the social representation of teenagers about aids, and the informative dimension of that representation by means of the measurement of scientific knowledge (TKSHA), could observe that the knowledge that adolescent groups have about this illness is hybrid, as it mixes scientific and common sense aspects.

The students who presented more scientific knowledge about the disease have evoked the word *blood* more often, and the students with less scientific knowledge, the word *sadness*. The most frequent evocation of the *blood* element indicates higher scientific knowledge about aids, as the student broadens the own understanding to beyond the pragmatic demands favored by media, in which the illness is dealt with predominantly as a sexual disease that can be protected against through the use of preservatives. The predominant concern focus from preventive messages emphasizes the prescription of preservatives rather than the in-depth understanding of the disease (which involves the role of blood, also in the sexual transmission of the HIV). It is what we indicate as partial knowledge of HIV/Aids in opposition to more complete knowledge. On the other hand, the word *sadness* refers more to an attitude towards aids than to a proper social representation, as its attention is circumscribed to the experienced feelings associated with the disease object.

Natividade (2010) also studied the relationship between social representations and the level of scientific knowledge about HIV/Aids. According to the author, the individuals usually present the following elements from the social representation on aids as being central: *illness, prevention, transmission, preservative, sex, suffering, fear*. But the people with lower levels of knowledge about aids aggregated three elements to those: *recklessness, death and care*. Among the participants who presented higher scientific knowledge, the five most frequent central elements, ranked by order, were the following: *illness, sex, prevention and preservative,*

transmission. The order among those with lower scientific knowledge was: *illness, death, suffering and preservative, sex*.

The group with less knowledge brought to light elements related to personal responsibility for the contagion of aids and the concern with death, differently from the group with more knowledge. The idea of death may hide the absence of information involving contents from antiretroviral therapy until the current tries for the creation of a vaccine. And personal responsabilization might also be connected to the lack of knowledge of the collective nature of the epidemic, while a topic related to the need of public policies. The *suffering* element is more frequently cited by participants with less scientific knowledge, data similar to the ones found by Camargo et al. (2007) for the *sadness* element in teenagers with low level of scientific knowledge. The emphasis given by participants with less knowledge to an element with an affective characteristic indicates the designation of the attitudinal dimension of the social representation on the illness more than the informational dimension itself.

Conclusions

The current approach of the diffusion of knowledge about aids has not taken into account the information set about the epidemy of aids, since the contents are mentioned in an isolated and superficial way. The individual is considered only as a receptor or a passive element in the process of communication related to information referring to the illness. And it is fundamental to make it possible that the individual receives the message and is able to find a position towards it, for the acquisition of knowledge and attitudes favorable to preventive practices. This implies promoting an interaction between scientific representations and consensual representations in the framework of scientific popularization actions.

The emphasis established by stimulating scientific knowledge in the formation of social representations on aids is in the context of the use of knowledge generated by the interaction of individualities that will further collaborate in the formation of collective knowledge. More than a simplistic view of the acquisition of information about HIV/aids, dynamic construction of knowledge must be promoted.

There is a necessity to create prevention and diffusion strategies that are not concerned solely with transmitting scientific knowledge, but rather with providing a relationship (interaction) with knowledge that is able to serve the interests and needs of the individual to interact in society, so that s/he feels able of employing what s/he knows to participate in society as a citizen, emphasizing the importance of the practical applicability of that knowledge for the personal relationship with the world.

Moreover, it is recommended that those strategies are tackled jointly with themes related to risk society and science diffusion, since the individual is immersed in the scientific happenings that surround this amplification of the presence of risk, at least in the sphere of social information. In everyday life not only the aids epidemic is present, but also atomic bombs, global warming, genetically modified foods, etc. Those strategies employed here for the understanding of the aids phenomenon might also contribute to add depth to the studies about the biological and social insecurity (Jodelet & Scipion, 1992) in which society currently lives.

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