

Alerta Alcohol

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Valorization Addendum

The results of the studies presented in this dissertation, about the design, cultural adaptation and effectiveness evaluation of the first web-based computer-tailored intervention designed to prevent alcohol consumption and BD among Spanish adolescents, provides a high content of knowledge that is relevant for researchers, clinicians, associated health professionals, families and patients. This dissertation provides a high societal and economic value, as the results presented can be used for further development, optimization, and dissemination of future web-based computer-tailored alcohol consumption and BD prevention interventions. This valorization addendum will discuss below the relevance of our study results, the target groups for which the results could be of interest, the health products, the degree of innovativeness of these products, and the planning for implementation.

Relevance

Alcohol is the most widespread psychoactive drug worldwide and one of the main avoidable causes of premature mortality, disease, and disability (Chestnov, 2014; Pulido et al., 2014). Currently, alcohol drinking has become endemic, and part of the social and cultural life, resulting in a great social permissiveness and a low perception of its risks. Alcoholic beverages are widely available, easily accessible to adolescents and lacks restrictive legislation (Espada et al., 2012; ESTUDES, 2018). The 2019 national Spanish survey ESTUDES showed that 75.8% of adolescents between 14 and 18 years of age drank alcohol in the last 12 months (ESTUDES, 2019).

In Spain, in the recent years, important changes have occurred concerning the amount of ingested alcohol and the drinking patterns, particularly in the adolescent and the young adult population (Parada et al., 2011). This specific pattern of adolescents consumption called binge drinking (BD), was defined as the consumption of 5 or more standard drinks per occasion for male, or 4 or more standard drinks for female, in about 2 hours (Jander et al., 2016; NIAAA, 2020). According to the 2019 national Spanish survey ESTUDES, 32.3% of students between 14 and 18 years of age reported BD in the last 30 days (ESTUDES, 2019). BD has become a great public health problem as it is held accountable for multiple long- and short-term adverse consequences, affecting neurocognitive development and leads physical injury and social alterations, with significant social and personal costs per year (Rehm et al., 2009; Falcón et al., 2018). Besides, BD in adolescents has been associated with vehicle accidents, violence, delinquency, homicide, suicide, sexually transmitted diseases, unintended pregnancies, school failure, mental illnesses (Farke et al., 2007; Howell et al., 2013; White & Hingson, 2013; Dormal et al., 2018; Falcón et al., 2018), as well as the development of an alcohol use disorder in adulthood or the consumption of drugs (Pulido et al., 2014). Therefore, these figures and their consequences highlight the importance of preventing BD among adolescents through effective interventions (Miller et al., 2007; Jander et al., 2014; Lima-Serrano et al., 2018).

Web-based computer-tailored interventions are considered to be a cost-effective approach in the prevention of alcohol intake as they can reach many people, have the potential to be effective, and can be distributed on a large scale for relatively low costs (Kelders et al., 2012; Schulz et al., 2013; Drost et al., 2016; Jander et al., 2016). These interventions give the possibility of obtaining highly tailored advice and feedback to the participants via the internet, helping to effectively change various health behaviours and their determinants (Dijkstra, 2005; Krebs et al., 2010; Kohl et al., 2013; Lustria et al., 2013). The effectiveness study showed in this dissertation show some promising indications to reduce the number of glasses of alcohol as heavy episodic drinking (HED)

(consumption of 10 or more glasses of alcohol on at least one occasion) (Best et al., 2006; Jander et al., 2016). Hence, the implementation of this intervention may contribute to the stabilization as well as reducing the number of glasses of alcohol intake among Spanish adolescents.

Target groups

The research described in this dissertation was funded by the Ministry of Health of the Regional Government of Andalusia (Junta de Andalucía), Spain. This organization aims to act in public health policies as well as in research and clinical practice of public health system, through the financing of health research, stimulating and promoting use of scientific knowledge to improve healthcare in the Andalucía, south of Spain. Accordingly, the results presented in this dissertation are of interest to the Ministry of Health of the Regional Government of Andalusia among others target groups that are presented below.

First and most important, the results of this dissertation are of value for target population of the intervention: Spanish adolescents, whether they have started drinking or not, as well as those who have engaged in BD or not. We focused on the general adolescent population as our prevention program, to reduce BD among adolescents, has a universal orientation. The implementation of this intervention will offer this group a tool that can help them to manage their alcohol consumption. Furthermore, this intervention could be useful for families since they are directly affected by the consequences of their children's alcohol consumption.

In addition, the Ministry of Education of the regional government of Andalusia, Spain, as well as teachers, counsellors and directors of schools could be interested in the results of this dissertation to increase their schools' investment in health promotion and carrying out this kind of study at schools crosswise as part of the health promotion curriculum.

Another important target group are health professionals, including researchers, physicians and nurse practitioners who work in Primary Care and School Health with adolescents, families, and patients, among others. Our findings can help to these health professionals to become aware of the risk factors and determinants for alcohol consumption and BD in this target group, as well as the need for using evidence based health promotion methods, including eHealth, for their own health services.

Finally, our results are relevant for policy- and lawmakers belonging to the Ministry of Health, of the government of Spain, as these could be used for developing and implement new policies regarding alcohol consumption and taking preventive measures to reduce alcohol consumption in adolescents. Our results indicate that (tailored) eHealth methods can be used to fight against alcohol problems. The results about the potential of using tailored eHealth methods are also relevant for the National Plan on drugs of the Ministry of Health - a political decision-making body formed by the members of the General State Administration and the Directors responsible for drug addiction policy in the autonomous communities. Their ambition is to foster harm reduction in order to achieve a healthier and safer society, and this thesis illustrates the potential of using eHealth as one strategy. From the point of view of organizational strategy, it is therefore relevant to involve the Spanish Council on Drug Addiction and other Addictions as a body for the participation for the development of such eHealth programs in the process of co-creation concerning the design, implementation and

evaluation of such programs, since a long-term challenge involves building together an architecture of excellence, quality and good governance in prevention.

Product

The main product of this dissertation is the cultural adaptation to the Spanish context, the implementation, and the effectiveness evaluation of the *Alerta Alcohol* program. This program is based on the Dutch program (*Alcohol Alert*) carried out by Jander et al., with the same objective (Jander et al., 2014; Jander et al., 2016). Therefore, based on the previous Dutch study as well as the literature and extensive formative research like focus group interviews with the target group (Chapter 3), and a Delphi and pilot study (Chapter 4), we culturally adapted it to the Spanish context, and finally we designed, implemented and evaluated the *Alerta Alcohol* program (Chapter 5).

Alerta Alcohol consists of real short stories adapted to gender in which the main character binge drank the night before and his or her friends talk with him or her about what happened. Participants could choose an avatar and the names of the characters in the stories. The program consisted in six sessions. Each session took approximately 1 hour. At the beginning, a baseline questionnaire (session 1) was shown, followed by two sessions at school (sessions 2-3), in which the drinking event took place in three scenarios: at home, at a celebration, and in a public place. In session 2 and 3, between the stories, questions and tailored messages were shown, which were designed to reduce alcohol consumption and BD, based on pre-motivational and motivational factors of the I-Change Model (de Vries et al., 2003) for example knowledge and risks about drinking and BD, the pros and cons of drinking, perceived pressure from friends and family to drink, and possible difficult drinking situations. In each scenario, self-efficacy was reinforced, and action plans are offered to the adolescent in order to reject alcohol and BD in the specific scenario. In addition, we developed questions and tailored messages aiming to increase self-esteem and awareness of factors such as the acknowledgement of risk perception of alcohol consumption and BD.

In addition, students had two booster sessions at their homes, one week after the third session at school. The fourth session was called “*The Challenge*”, where adolescents could accept the challenge of not drinking or at least not binge drink at an upcoming drinking event; the program reminded students again of the advice and action plans for this type of event. In the fifth session, two days after this event, the program evaluated the challenge to determine whether or not the participants drank or at least whether they engaged in BD during this drinking event. When the adolescent manages to achieve this goal, a congratulatory message is given to reinforce the positive behaviour; if he/she did not manage to achieve it, he/she is asked about the reasons, so that he/she can receive feedback and information about external and internal reasons for that behaviour and what to do about it. In this feedback, adolescents are encouraged to continue avoiding/reducing alcohol consumption by using a cue reminder (an object that helps them remember not to consume four/five glasses of alcohol) at the next social event. Finally, adolescents are encouraged to repeat the challenge if they wish to. At the end of the study, all students had to complete the sixth session at school, i.e., the follow-up questionnaire (see Appendix 2 (Table 1)).

Innovation

The *Alerta Alcohol* program is the first Spanish program to reduce BD among Spanish adolescents in the school environment through Web-based Computer-Tailored intervention. Although several interventions exist to reduce alcohol consumption in the

Spanish context, few evaluate and address BD. Furthermore, no similar study has targeted these issues using CT technology, nor they are based on the I-Change Model as model to change health behaviour at high school level to date (Lima-Serrano et al., 2018). Therefore, to our knowledge, in the Spanish context, there is no similar study targeting alcohol consumption and BD prevention using a web-based computer-tailored intervention in adolescents, which makes it very innovative.

Furthermore, the studies presented in this dissertation are one of the first that have addressed and described the process of cultural adaptation of a web-based computer-tailored program. Design, implementation, and evaluation of health programs are a costly and time-consuming endeavour (Escobar-Chaves et al., 2011). Therefore, a pragmatic vision building upon "what works and was effective" was used instead of creating a new program from scratch, as this would be the most expensive and slow option (Villarruel et al., 2005; Zometa et al., 2007). In this sense, as both replication and implementation are important for science, we are convinced that this intervention is highly relevant and innovative.

It is known that web-based computer-tailored interventions give the possibility of obtaining highly tailored advice to the participants, helping to effectively change various health behaviours and their determinants (Dijkstra, 2005; Krebs et al., 2010; Kohl et al., 2013; Lustria et al., 2013). Nearly all previous web-based computer-tailored interventions have used text-driven messages to deliver intervention content, as in our study. And it is known that, recently, more studies have been developed that use video-based messages (Vandelanotte & Mummery, 2011; Walthouwer, Oenema, Soetens, Lechner & de Vries, 2013; Stanczyk et al., 2014), or even serious games (Connolly et al., 2012; DeSmet et al., 2014; Jander et al., 2016) to increase the attractiveness of these interventions. In our case, given that it is the first health web-based computer-tailored intervention carried out in Spain, the use of texts was used as a first step, with later planned improvements.

In addition, since the personalization and feedback are an effective working mechanisms of computer-tailored interventions (Dijkstra, 2005; Schulz, et al 2013; Jander et al., 2015), we added important innovations to the original program by adding the possibility of further personalizing stories, choosing avatars and choosing character names. Another innovation concerned making the program more gender tailored by presenting short stories for boys, and short stories for girls, and we designed gender specific avatars. Besides the delivery format, our intervention is also innovative because of its personalized content. For example, only a few interventions have incorporated messages and advice to improve adolescents' self-esteem, as well as providing action planning for specific situations. Finally, implementation in schools of tailored eHealth programs as part of the health promotion curriculum was innovative as such programs do not exist in Spain.

Planning & Implementation

The current product of this dissertation could be an effective, innovative tool to solve this important societal problem which is BD and alcohol consumption in Spanish adolescents. The effects of the *Alerta Alcohol* program showed that the program can successfully reduce heavy episodic drinking (HED) in Spanish adolescents (Chapter 5). Although, an overall effect of the intervention on BD was not found at 4 months, there was also a trend in BD reduction in both conditions. These are promising results. Yet, before the *Alerta Alcohol* program can be implemented on a larger scale (e.g., nationally

or Andalusia) to benefit both adolescents and schools, some improvements to the program and the intervention should be made, such as those mentioned below.

A high problem with this kind of interventions is attrition rate of adolescents and schools. Therefore, this intervention could be adapted and improved to increase adolescent adherence, and thereby increase the effectiveness to the program. We followed the recommendations from previous study by Jander et al. (2016), and by the experts from the Delphi study (Chapter 4), it was even improved over other studies. Among the recommendations, it was highlighted to carry out almost the entire study at schools crosswise as part of the school health promotion curriculum, even being supervised by researchers, by phone, email or even in person at school. But, the completion rates of the current intervention remain very low to determine the real effectiveness (Chapter 6). To improve adherence in future interventions with Spanish adolescents, it is necessary to be familiar with the predictors of adherence. In our study, educational level and ethnicity were showed as predictors of adherence. Therefore, the focus should be on how to better involve adolescents who belong to different academic years and ethnicity to increase effectiveness. Moreover, the analyses of adherence also indicated that non-binge drinkers adhered better to the intervention. This is because, as a rule, people who adhere better to a health program tend to have better lifestyle habits (Schulz et al., 2012). Our prevention program has a universal orientation, focusing on the general adolescent population, but perhaps a different approach is necessary through selective prevention (Foxcroft, 2014). The intervention could be tailored and personalized to consumers and non-consumers.

In addition, implementation of *Alerta Alcohol* could occur via social media, since Internet are considered the most visited place and where children and adolescents stay for significant amounts of time. Although, in order to make this program successful on social media, we may need to identify how to best do this and also how to optimize attention and adherence.

These improvements should be made in the presentation of the program to improve adolescent adherence, for example by developing usability studies of gamification-based interventions, such as video or serious games, in addition to improving questions and messages. These possible versions, of course, will have to be evaluated again in terms of effectiveness as well as intervention use. Besides, based on the problem reported by schools regarding to the Wi-Fi connection, a solution would be to carry out the also off-line intervention, previously installed in the school computers. Furthermore, results of the focus group study conducted in this dissertation (Chapter 3) showed that parents are still important and influential people in their children' alcohol consumption. Hence, the effect of an additional parental component should be evaluated, in the future, through a randomized controlled trial, e.g., adding three arms, one with parents' intervention, other without parental component, and control group.

After a successful adaption of the *Alerta Alcohol* program, we recommend its implementation, first, at the level of the Autonomous Community of Andalusia, southern Spain, through the "Forma Joven Program" belonging to the Andalusian Health System (SAS). The Regional Ministry of Health and Family of the Junta de Andalucía provides schools a diverse range of schools health interventions targeted at various health behaviours of children and adolescents, in the following lines of intervention: Emotional education; Healthy Lifestyles; Sexuality and Equal Relations; Positive use of ICT; Prevention of the Consumption of Alcohol, Tobacco, Cannabis and other Drugs. Our eHealth program thus would fit well in this context.

Next, the program is also relevant to be implemented by the Regional Ministry of Education and Sports of the Junta de Andalucía, given that health promotion in a transversal way in schools. A significant problem is that the implementation of health promotion programs is dependent on the voluntariness of schools and teachers, which causes low participation of schools in interventions that take time from school hours. In this way, teachers, counsellors and directors of schools could simply choose an intervention that they consider necessary and feasible to implement in their school, within established hours for the promotion of health.

In addition, the Seville City Council, as well as that of other cities, could implement the *Alcohol Alert* program in its "Health Promotion with Young People" program, which is aimed at young people from associations, socio-educational groups, summer schools, etc. ., from the city of Seville, as they serve as an important access point to reach large parts of the Sevillians and Spanish population. Besides, it could also be implemented through collaboration with healthcare organizations, eHealth organizations, or other regional or national socio-health care centres, as well as the "*Andalusian Foundation for Drug Addiction Care*" in Andalusia, "*Proyecto Hombre*", "*Al-Anon*" (Help for family and friends of alcoholics) , or the national association of "*Alcoholics Anonymous*" (AA), between others.

The benefits of this program for the adolescent, the schools and the society could be perfectly perceptible, independently of the way that the adolescents get in contact with the program. It could have a large public health impact for relatively low costs. The only costs associated with the implementation of the intervention will be the hosting costs of the tailoring software package (*TailorBuilder*) and the website, which are not very high. It should be into account that whether the program is implemented in a future through gamification this could further increase the cost, so it could be risk associated with the large-scale implementation of the intervention. However, the implementing organization (e.g. the Regional Ministry of Education and Sports or Regional Ministry of Health of the Junta de Andalucía) should take responsibility for bearing these costs, otherwise the intervention cannot be used in practice. Nevertheless, this program could decrease adolescents' alcohol consumption and others will not start drinking. decreasing the possibility of acquiring short and long-term health problems. In addition, society and the health system will benefit, since this will be highlighted in the decrease in costs associated with alcohol consumption.