Health beliefs affect the correct replacement of daily disposable contact lenses: Predicting compliance with the Health Belief Model and the Theory of Planned Behaviour

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A B S T R A C T

Purpose: To assess the compliance of Daily Disposable Contact Lenses (DDCLs) wearers with replacing lenses at a manufacturer-recommended replacement frequency. To evaluate the ability of two different Health Behavioural Theories (HBT), The Health Belief Model (HBM) and The Theory of Planned Behaviour (TPB), in predicting compliance.
Method: A multi-centre survey was conducted using a questionnaire completed anonymously by contact lens wearers during the purchase of DDCLs.
Results: Three hundred and fifty-four questionnaires were returned. The survey comprised 58.5% females and 41.5% males (mean age 34 ± 12 years). Twenty-three percent of respondents were non-compliant with manufacturer-recommended replacement frequency (re-using DDCLs at least once). The main reason for re-using DDCLs was "to save money" (35%). Predictions of compliance behaviour (past behaviour or future intentions) on the basis of the two HBT was investigated through logistic regression analysis: both TPB factors (subjective norms and perceived behavioural control) were significant ($p < 0.01$); HBM was less predictive with only the severity (past behaviour and future intentions) and perceived benefit (only for past behaviour) as significant factors ($p < 0.05$).
Conclusions: Non-compliance with DDCLs replacement is widespread, affecting 1 out of 4 Italian wearers. Results from the TPB model show that the involvement of persons socially close to the wearers (subjective norms) and the improvement of the procedure of behavioural control of daily replacement (behavioural control) are of paramount importance in improving compliance. With reference to the HBM, it is important to warn DDCLs wearers of the severity of a contact-lens-related eye infection, and to underline the possibility of its prevention.

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1. Introduction

Interest in compliance in the contact lens field has increased steadily since the 1980s. It was initially noted that ocular signs and symptoms during contact lens (CL) wearing were correlated with the level of wearer compliance [1], although this result is from the era of reusable and non-disposable lenses. Several subsequent studies have demonstrated that several non-compliant behaviours correlate with a higher risk of keratitis [2–4] and ocular inflammation [5].

One of the most studied non-compliant behaviours is the incorrect replacement rate of CL. There is a high level of non-compliance in following the manufacturer-recommended replacement frequency (MRRF) or the practitioner-recommended replacement frequency (PRRF) [6–10], with patients being less compliant with two-week CL than with one-month or daily disposable contact lenses (DDCLs) [6–8,10].

Chalmers et al. found that DDCLs can lower the risk of corneal infiltrative events [11]. Reusing DDCLs can represent an important risk, as these wearers are less likely to receive proper training in cleaning and disinfecting lenses, and may not use a lens case or disinfecting solutions [12]. This may explain why, despite the possible benefits of DDCLs, some studies have found a similar risk of microbial keratitis in DDCLs and in other kinds of soft CLs [4].

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The rate of non-compliant replacement of DDCLs varies from study to study. In 2007, Donshik et al. [6] found better compliance in following the recommended replacement schedule among DDCLs wearers compared to longer replacement contact lenses wearers. Nevertheless, the authors provide no clear estimation of the level of compliance.

In 2009 Dumbleton et al. [7] demonstrated that the non-compliance rate differs when the MRRF (15%) and the PRRF (12%) are considered. There are country-to-country variations in non-compliance rates: in the US, Yeung et al. [8] found a non-compliance rate of 14% in DDCLs wearers. A similar finding of 12% was seen by Dumbleton et al. in 2010 [13]. Canada's non-compliance rate was found to be 13% [14]. A more recent multi-country study found non-compliance rates of 18%, 12%, 7% and 4% in Australia, the US, the UK and Norway, respectively [15]. However, in two studies, non-compliance with MRRF for DDCL was much higher: 26% in the 2013 Dumbleton et al. study [10], and 30% in the 2011 Boost et al. study [12]. "*To save money*", "*no risk in reusing*" and "*running out of lenses*" were the primary reasons given in some studies for reusing DDCLs [10,15].

Over the past 40 years, many different models, known as Health Behaviour Theories (HBT), have been proposed to understand the determinants that can influence the likelihood of a certain health-related behaviour and possibly modify that behaviour accordingly. These include the Health Belief Model (HBM) [16] and the Theory of Planned Behaviour (TPB) [17,18].

The HBM states that there are two main components affecting health-related behaviours: threat perception and behavioural evaluation. Threat perception includes two sub-components, perceived susceptibility and anticipated severity [19]. While perceived susceptibility refers to the extent an individual feels vulnerable to a health illness, anticipated severity refers to the perceived severity of the consequences of that illness. On the other hand, behavioural evaluation includes the potential benefit gained by engaging in a health behaviour (perceived benefit) and the perceived obstacles to enacting a health behaviour (perceived barriers) [20].

The TPB is a more general model that predicts behaviour from its immediate predictor, behavioural intentions. In turn, intention is determined by three main components: attitude, perceived behavioural control and subjective norms [17]. Attitude refers to a person's overall evaluation of a behaviour, perceived behavioural control refers to a person's perception of control in executing a behaviour and subjective norms refer to a person's beliefs about whether significant others (e.g. family members or peers) think he/she should engage in that behaviour [20,21].

TPB has been applied to many health-related behaviours, such as exercise behaviour, oral hygiene behaviour, clinical or screening behaviour or HIV/AIDS health-related behaviour [21], but not to the study of compliance in the CL field. HBM has been applied to different health-related behavioural domains [22] and, in one study, HBM was used to study compliance in contact lens wearers [23]. To our knowledge, neither of the two models have been used to study incorrect replacement of CLs. Furthermore, HBM was never directly compared with the TPB in order to analyse their predictive powers for compliance. In fact, although both models have been shown to contain the most important psychological predictors of health-related behaviours, only a few studies have directly addressed the relative importance of these variables [19]. Although there are some recent studies in the DDCL literature that have demonstrated how attitudes toward CL affect wearers' intentions and behaviour [24–27], there has been little work using HBT models in the CL domain.

Thus, the aim of this study is to assess the compliance of DDCL wearers, in terms of the frequency of replacement in line with MRRF in Italy, and to evaluate the ability of two different health behaviour theories, namely the Health Belief Model and the Theory of Planned Behaviour, to predict past and future compliance.

2. Methods

A multi-centre survey was conducted among different opticians in Italy. The study was conducted following the tenets of the Declaration of Helsinki. The opticians were initially invited, by mail, to participate in the study. They were chosen as representatives of different geographical areas (North, Centre and South) and city sizes (big cities, small cities), but also of different types of practice (independent, independent linked by buying syndicate, chains). However, as it was not possible to know how large the pool of DDCL purchases was over that time, the penetration rate could not be exactly estimated.

Every practice which agreed to participate in the study appointed a person to be in charge of collecting data. These employees were positioned at the front desk and instructed to hand the questionnaire to customers during the purchase of CLs. No compensation was given for participation. Participants were considered eligible for the survey if they had been DDCLs wearers for at least 6 months and if they were purchasing DDCLs, irrespective of the type. To avoid bias, the questionnaire was completed anonymously and without the CL practitioner being present. It was felt that this arrangement would be useful in preventing denial of non-compliant behaviour and so help in establishing the actual rate of non-compliance. The survey was conducted from October 2012 to January 2013.

The questionnaire included the following four sections:

- <u>Demographic</u>. This section included three questions evaluating gender, age and occupation.
- <u>CL history of use and current wearing pattern.</u> This section included four questions evaluating: number of years of previous CL use (up to 3 years, 4–6, 7–9, 10–12, more than 12); whether other types of non-DDCLs CLs were used (yes or no); number of days of wear per week; and number of hours of wear per day (up to 3 h, 4–6, 7–9, 10–12, more than 12).
- <u>Compliance, in terms of the extent of DDCL re-use.</u> The first question evaluated if, in the previous month, the respondent re-used DDCLs: "In the last month did you use your CLs for more than one day?". The variable "Past compliance" was coded 1 for those who answered "No" (compliant behaviour) and 0 for "Yes" (non-compliant behaviour). Three further questions were only asked to those who stated that they had re-used DDCLs regarding: how many times the interviewee re-used DDCLs; how many days on average the same DDCLs were used; and the main reason for re-use. Finally, future intentions to comply were measured by asking the participants how likely he/she was in the next month to replace the CLs every day (5 point Likert scale from 1 "definitely no" to 5 "definitely yes") (see Table 1).
- <u>TPB and HBM</u>: The final part of the questionnaire explored the two models studied in the research. For the former, we used a reduced-TPB model to keep the questionnaire short and simple enough for its specific setting (during CLs purchasing), and, for this reason, items on attitudes were eliminated. Subjective norms were explored by asking the interviewee whether the majority of people considered to be important by them would think it necessary to replace DDCLs every day. Perceived behavioural control was explored by asking if the interviewee perceived him/herself to be able to control the DDCLs everyday replacement. All items used a 5 point Likert scale ranging from 1 "definitely no/no control" to 5 "definitely yes/complete control" (see Table 1).