

ORIGINAL ARTICLE

Sun-safe behaviours, personal risk, level of concern, and knowledge about cutaneous melanoma in Italy: time for social marketing?

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Keywords

Cutaneous melanoma • Prevention • Risk • Concern • Protective Behaviour • Knowledge • Social marketing

Summary

Introduction. The incidence of cutaneous melanoma is increasing, although 80-95% of all deaths caused by melanoma can be avoided through protective behaviours. There is evidence that social marketing as an approach in public health can improve health-related behaviours and encourage sun-safe behaviours.

Methods. A multicentre survey was conducted to collect and compare data about cutaneous melanoma risk, knowledge, concern, and protective behaviours across Northern, Central, and Southern Italy, and explore how these data could potentially inform a social marketing intervention to improve sun-safe behaviours. Data were analysed using descriptive and inferential statistics.

Results. A total of 1,028 questionnaires were collected. Apart from 'Personal Risk' no statistically significant differences were found between the three regions. About 30% (n = 344) of the

total sample had high levels of personal risk, and low levels of concern and protective behaviour, and over 70% (n = 711) gave priority to sun tanning. The worst scores were related to knowledge about melanoma (30% wrong answers, and over 40% 'don't know'). Protective behaviour was moderately correlated with age (p = 0.03). Personal risk was significantly higher in women (10.84 vs 10.05), and lower in individuals with a degree (9.46 vs 11.38; p < 0.001).

Conclusions. Over 70% of our sample gave priority to sun tanning, which combined with low levels of concern and knowledge about melanoma, and high levels of personal risk, confirm that much still needs to be done in terms of melanoma prevention, but all these are aspects that could be effectively addressed through social marketing interventions.

Introduction

In the world, approximately 60,700 people die each year due to cutaneous melanoma, with a global incidence of 3.1% for a total of 287,723 cases [1]. In Europe, over 27,000 people die each year due to cutaneous melanoma, with an incidence of 3.4% for a total of 144,209 new cases in 2018 [1]. In Italy, in the last 20 years, the incidence of melanoma has increased by over 4% a year [2]. Currently, the incidence of melanoma in Italy is 3.0% for a total of 12,299 new cases in 2018, and a 5-year prevalence rate of 42,220 cases [1]. According to Globocan 2018, around 2,300 (1.3%) Italians die each year, and this rate is still increasing [1, 2].

Over 70% of the adults prefer to tan when on holiday, but Italians' average summer holidays have significantly reduced since 2000 [3]. According to the Italian National Statistics Institute the average length of stay in holiday resorts has gone down from 4.2 nights in 2000, to 3.4 nights in 2015 [4]. Therefore, given that there is evidence that Italian young people value a tanned look this could result in them trying to tan in a shorter time increasing the risk of sunburn [5, 6] and subsequently increase the risk of cutaneous melanoma [7, 8].

Cutaneous melanoma is the most aggressive of all skin tumours [5, 7] but also one of the most preventable cancers [9]. Studies in both Europe and the United States have shown that the use of sunscreen reduces the incidence of Melanoma by up to 34-38% [10, 11]. Given this evidence, it is important to implement appropriate preventive measures on a continued basis, and an effective solution could be offered by social marketing [12-15]. In addition, to be truly effective, interventions need to be adapted to the knowledge, beliefs and attitudes of the population and explore how these influence the motivation to adopt preventive behaviours [16, 17]. Furthermore, given Italy's geography that presents a long north to south peninsular it may be that this geographical status (and subsequent variations in climate) has an effect on sun exposure behaviour and knowledge. This geographical element has not been studied before in any nationally based surveys, thus we decided to build this aspect into our study.

THE THEORETICAL FRAMEWORK

The Health Belief Model (HBM) is a psychological model that attempts to explain and predict health behaviours [18-20] and is used to study problems related

to compliance and preventive behaviours. 'Belief' plays an important role in moulding healthcare and lifestyle behaviours [19]. Knowing individuals' opinion about health problems, how they perceive facilitators and barriers to action, and their level of self-efficacy, enables to understand why health promoting behaviours are adopted.

The HBM defines the key factors that influence health behaviours, as an individual's perceived threat to disease (perceived susceptibility), belief of consequence (perceived severity), potential positive effects of action (perceived benefits), perceived barriers to action, exposure to factors that prompt action (cues to action), and confidence in the ability to succeed (self-efficacy) [20]. These perceptions are influenced by "Modifying Variables", such as age, gender, psychosocial factors, knowledge and experience about the disease [21]. Modifying variables also influence the perception of self-efficacy, which is the belief in one's ability to implement a certain type of behaviour [16, 17]. Finally, the HBM requires 'Cues to Action' to trigger the adoption of preventive behaviours. Cues to Action can either be internal (i.e. symptoms, concerns, wishes, etc.) or external (i.e. advertisement, influence by significant people etc.).

On the basis of the key factors of the Health Belief Model, in the present study we selected the following tool "A Questionnaire to measure melanoma risk, knowledge and protective behaviour" developed and validated by Gillespie et al. 2011 [22] between 2008 and 2010. Thanks to the compatibility of the questionnaire with the HBM, it was possible to incorporate the key results into a conceptual framework.

SOCIAL MARKETING

Social marketing has been defined as "the systematic application of marketing, alongside other concepts and techniques, to achieve specific behavioural goals, for a social good" [23]. Governments and health organisations regularly utilise social marketing strategies to convey health messages. Social marketing interventions generally aim to ensure that the target audience adopts the behaviour being promoted [24]. Social marketing techniques have been used successfully in public health interventions [25]. In particular social marketing has been used effectively in tackling sun safe health related behaviour change in Australia where a number of studies have highlighted the effectiveness of the use of social marketing in promoting sun-safe behaviours [26, 27].

For social marketing research and practice, HBM is a significant theoretical model when addressing issues for "at risk" populations who may not perceive themselves as such. HBM has been widely used in the application of social marketing in challenging a range of health-related behaviour change interventions. This paper provides a rationale for combining HBM with a social marketing framework to demonstrate the potential for social marketing intervention(s) to promote sun-safe behaviours.

THE RESEARCH HYPOTHESIS

Given the close link between melanoma and sunbathing behaviours and also considering that Italy has an extension of 1291 kilometres, we explored if there were any significant differences or features in the level of melanoma risk, concern, protective behaviour, and knowledge between Northern, Central and Southern Italy.

AIMS

The objectives of this study were to:

1. validate the Italian version of the tool 'A Questionnaire to measure melanoma risk, knowledge and protective behaviour' by Gillespie et al. 2011 [22];
2. collect and compare data on melanoma risk, knowledge, concern, and protective behaviours between Northern, Central, and Southern Italy;
3. explore the potential for social marketing intervention to improve sun-safe behaviours in Italy.

Methods

THE STUDY DESIGN

This is a multicentre observational questionnaire-based survey study with the aim of surveying melanoma knowledge, behaviour and risk awareness using the Italian version of the "Questionnaire to measure melanoma risk, knowledge and protective behaviour" [22].

TRANSLATION AND VALIDATION OF THE TOOL

Tool characteristics

"A Questionnaire to measure melanoma risk, knowledge and protective behaviour: Assessing content validity in a convenience sample of Scots and Australians" by Gillespie et al. [22] was selected for our study because it best reflected the theoretical framework of our study. The questionnaire consists of four items about personal data; three items on previous melanoma diagnosis; and 39 questions across four domains: Personal risk; Level of Concern; Protective Behaviour; and Knowledge about Melanoma. This latter domain, 'Knowledge about Melanoma', differed from the other domains because it contains questions regarding the factors that increase the risk of developing a melanoma, to which the responses were either correct or wrong. Respondents could also reply "I don't know", if they were not sure.

With regard to the calculation of the score, full details are provided in Gillespie et al. [22] who developed the original tool. The scores for each response were based on relative effect sizes from epidemiological meta-analyses [8, 28-33]. However, to provide an example, for each question respondents had to select an answer from a range of options. The number of options varied according to the type of question, and each option was associated with a score that reflected for instance the level of risk in the domain "Personal risk" [e.g. What happens to your skin in the sun? Never tans (score: 6); Tans with difficulty (score: 4); Tans easily (score: 2); Tans always (score: 0)]. Sometimes, the score of a response is below zero, like the following

question in the Domain “Protective Behaviour” [e.g. If you use a sun lamp, how often do you use it? Very infrequently (0); 1-3 times a year (-1); monthly (-2); weekly or more (-3)]. Then the overall scores for all the questions within each domain were summed up.

The four domains reflect the constructs of the Health Belief Model: the perception of risk, the perception of the seriousness of the disease, the perception of protective behaviours, and the perception of the factors that hinder protective behaviours. The above perceptions are influenced by personal characteristics (modifying variables) and by psychosocial variables, awareness and experience linked to melanomas.

Translation accuracy and face validity

To ensure consistency between the English original version and the Italian translation, we adopted the back-translation method. Two expert native Italian translators separately conducted the English-Italian forward translation. The two Italian versions were compared, and any differences were resolved following a discussion with the research team. The resulting Italian version was then translated back into English by a third translator. To check the face validity and clarity of the Italian version, in May 2013 it was piloted on 100 people in the waiting rooms of a dermatological hospital in Rome. We initially intended to pilot it on a sample of maximum 30 people, but while we were conducting the pilot study in the waiting rooms, more people than we needed asked us if they could also complete the questionnaire. The results of these 100 persons were not included in the results shown in the manuscript, because the purpose of the pilot was to ensure face validity.

DATA COLLECTION

Sample and setting

Between June 2013 and January 2017, the questionnaire was administered to a general adult population in the waiting rooms of two dermatology outpatients' clinics, one in Genoa and one in Messina. In Rome, the questionnaire was administered to the general public, in the main streets of the city. Here respondents were asked to invite friends and relatives (snowball methodology). This enabled us to compare the sample of the dermatology clinics with that of the general public. In both cases, to ensure the highest possible level of representativeness of the characteristics of the general population, the only inclusion criterion was that respondents had to be adults aged ≥ 18 years. With regard to the sample size, we referred to the one chosen for the validation of the original questionnaire ($n = 540$) by Gillespie et al. [22]. According to the Health Belief Model, the independent variables of our study include age, gender, psychosocial factors (job, education, family member with melanoma or knowing someone with a melanoma), knowledge about melanoma, and direct experience of melanoma. Age was treated as a continuous variable. Gender, psychosocial factors and experience of melanoma were treated as nominal variables and knowledge of melanoma variables were used to create a total score for knowledge about melanoma and this was treated as a continuous variable.

Consent and confidentiality

Patients completed the questionnaires exclusively on a voluntary basis. To ensure anonymity, we did not collect the patients' names, addresses and dates of birth. All those who completed the questionnaire gave their consent.

Statistical analysis

The data from the paper questionnaires were manually coded and then entered into a Microsoft Excel database. Then all the data were exported into STATA SE13 software for statistical analysis. Data were analysed using a range of descriptive statistics (mean scores, standard deviations, minimum and maximum ranges, quartiles and 95% confidence intervals) and inferential statistics to examine relationships among variables and questionnaire domains (Cronbach's alpha, Spearman's correlation, t-test ANOVA and Chi Square tests).

Ethical approval and permissions

This study was approved by the Ethics Committee of the University of Genoa. Permission to collect data from patients in the waiting rooms was obtained from the two dermatology centres.

Results

SAMPLE SIZE AND CHARACTERISTICS

We collected a total of 1028 questionnaires, of which 465 in Northern Italy (Genoa), 324 in Central Italy (Rome), and 239 in Southern Italy (Messina). Our total sample consisted of 415 males (40.3%) and 613 females (59.7%) for a total of 1028 individuals, and a mean age of almost 44 years. With regard to education, 167 (16.8%) had a secondary school certificate; 430 (43.4%) had a high school diploma; and 354 (35.7%) had a degree. With regard to occupation, 229 (25.8%) worked in an office, 118 (13.3%) had an intellectual/scientific profession, 71 (8%) were unskilled workers, 51 (5.7%) were unemployed, 19 (2.1%) were artisans or farmers, 84 (9.5%) were students, and 103 (11.6%) were retired. Of the total sample, 44 (4.3%) declared that they had a previous diagnosis of melanoma; 114 (11.2%) declared that they had a member in their family with a melanoma; and 373 (37.9%) declared that they knew someone apart from their family who had a melanoma (Tab. I).

Translation accuracy, face validity and reliability

The same questions were asked to everyone and at the end of this piloting phase only very few amendments were made to the questionnaire, such as the term “Caucasian”, which was substituted with “having a white skin”. This was necessary to ensure more clarity because many respondents misunderstood the meaning of this term. Consequently, to resolve this issue fully we changed also the respective question “What is your ethnic origin?” into: “What is the colour of your skin?” Considering the total sample of 1028 questionnaires, Cronbach's alpha was equal to 0.63 (range between < 0.5

Tab. I. Sample characteristics.

	Genoa	Rome	Messina	Total
Total sample distribution	465	324	239	1,028
Mean age				
Years (standard deviation)	45.1 (\pm 16.5)	42.0 (\pm 14.3)	44.6 (\pm 18.1)	43.9 (\pm 16.3)
	N (%)	N (%)	N (%)	N (%)
Gender				
Male	191 (41.1)	142 (43.8)	82 (34.3)	415 (40.3)
Female	274 (58.9)	182 (56.2)	157 (64.6)	613 (59.7)
Education				
Elementary	17 (3.7)	14 (4.5)	8 (3.5)	39 (3.9)
Secondary school	60 (13.2)	48 (15.4)	59 (26.1)	167 (16.8)
High school	224 (49.2)	105 (33.8)	101 (44.7)	430 (43.4)
Degree	153 (33.6)	144 (46.3)	57 (23.5)	354 (35.7)
None	1 (0.2)	-	1 (0.4)	2 (0.2)
Occupation				
Manager executives	15 (3.5)	9 (3.7)	13 (6.0)	37 (4.2)
Intellectual/scientific job	52 (12.1)	44 (18.2)	22 (10.1)	118 (13.3)
Technician	6 (1.4)	14 (5.8)	-	20 (2.3)
Office job	106 (24.8)	96 (39.7)	27 (12.4)	229 (25.8)
Commercial & service	26 (6.1)	26 (10.7)	6 (2.8)	58 (6.5)
Artisan & farmer	9 (2.1)	8 (3.3)	2 (0.9)	19 (2.1)
Driver	6 (1.4)	3 (1.2)	-	9 (1.0)
Unskilled worker	37 (8.6)	24 (9.9)	10 (4.6)	71 (8.0)
Army/police	10 (2.3)	10 (4.1)	1 (0.5)	21 (2.4)
Student	44 (10.3)	7 (2.9)	33 (15.1)	84 (9.5)
Unemployed	19 (4.4)	-	32 (14.7)	51 (5.7)
Housewife	31 (7.2)	1 (0.3)	36 (16.5)	68 (7.6)
Retired	67 (15.7)	-	36 (16.5)	103 (11.6)
Have you ever had a melanoma diagnosed in the past?				
No	411 (89.3)	311 (95.4)	221 (93.2)	943 (92.2)
Don't know	25 (5.4)	6 (1.8)	5 (2.1)	36 (3.5)
Yes	24 (5.2)	9 (2.8)	11 (4.6)	44 (4.3)
In your family, has anyone had a melanoma?				
No	341 (74.5)	258 (79.9)	191 (80.6)	790 (77.6)
Don't know	66 (14.4)	22 (6.8)	26 (11.0)	114 (11.2)
Yes	51 (11.1)	43 (13.3)	20 (8.4)	114 (11.2)
Apart from your family, do you know anyone who has had a melanoma?				
No	229 (49.9)	167 (51.5)	123 (52.3)	519 (52.7)
Don't know	62 (13.5)	28 (8.6)	36 (15.3)	92 (9.4)
Yes	168 (36.6)	129 (39.8)	76 (32.3)	373 (37.9)

and ≥ 0.9); therefore, the internal consistency of the questionnaire was acceptable [34].

Spearman's correlation between the four domains of the questionnaire in the total sample: "Personal Risk"; "Level of Concern"; "Protective Behaviour"; and "Knowledge about Melanoma" was low but positive, and significant correlations were found between: "Personal Risk" and "Knowledge about Melanoma" ($Rho = 0.1328$, $p < 0.001$); "Level of Concern" and "Protective Behaviour" ($Rho = 0.2800$, $p < 0.001$); "Level of Concern" and "Knowledge about Melanoma" ($Rho = 0.1903$, $p < 0.001$); and "Knowledge about Melanoma" and "Protective Behaviour" ($Rho = 0.2180$, $p < 0.001$).

INDEPENDENT VARIABLES

The relationships between the independent variables and the domains of the questionnaire were as follows:

- *age*: only "Protective behaviour" showed a moderate correlation with age ($r = 0.259$ and $p = 0.03$);
- *gender*: only "Personal Risk" was found to be significantly higher in women (10.84 vs 10.05), whereas

"Melanoma Knowledge" was higher in men (3.46 vs 2.97);

- *education*: there was a significant difference between those who have a degree and those with secondary education (9.46 vs 11.38; $p < 0.001$) only for "Personal Risk";
- *occupation*: no significant differences were found;
- *family member with melanoma or knowing someone with a melanoma*: no statistically significant differences were found for these variables.

TOTAL MEAN DIFFERENCES BETWEEN NORTHERN, CENTRAL AND SOUTHERN ITALY

We did not find any statistically significant differences between Northern (Genoa), Central (Rome), and Southern Italy (Messina) on the total score of the questionnaire. However, there were some statistically significant differences between cities on specific domains.

For "Personal Risk" domain (score range from -2 to 22) the global mean score was 10.5. Genoa obtained the highest mean score (11.1), followed by Rome (10.3), and

Messina (9.5) and the score on this domain was statistically significantly lower for Messina than the other two cities. On the domain of 'Melanoma Knowledge' (score range from -6 to 20) the global mean score was 3.1. Rome obtained the highest mean score (3.6), followed by Messina (2.91), and Genoa (2.9) and the score for Rome was statistically significantly higher for Rome than Genoa.

DESCRIPTIVE RESULTS

Domain 1: "Personal Risk"

Although there were no statistically significant differences between North, Central, and Southern Italy. However, some noteworthy facts emerged from our data.

In the domain of 'Personal Risk' (Tab. II) the main differences between the three regions involved two items: '*How many moles do you have?*' and '*Do you have large moles with an irregular edge and/or colour?*' In the first case, 8.1% of the respondents from Genoa replied 'none' compared to 26.9% from Messina. In the second case, 13.9% of the respondents from Rome replied 'don't know' compared to 40.6% from Messina. Interestingly, over 36% of the total sample never tanned or tanned with difficulty, approximately the same percentage (35.2%) had freckles, and almost 48% had more than 20 moles. Another interesting fact was that about one-third of the total population had experienced a bad sunburn for more than three times, and that 27% of the total sample did not know if they had large moles with an irregular

Tab. II. A comparison between Northern (Genoa), Central (Rome), and Southern (Messina) Italy with regard to the number of responses given to the items in the Domain of "Personal Risk".

Domain 1 "Personal Risk"	Response items	Genoa % (n)	Rome % (n)	Messina % (n)	Total % (n)
1. What happens to your skin in the sun?	Never tans, always burns	11.7% (54)	7.4% (24)	14.2% (34)	10.9% (112)
	Tans with difficulty	25.6% (119)	29.4% (96)	21.3% (51)	25.9% (266)
	Tans easily	56.8% (262)	52.5% (171)	52.5% (126)	54.4% (559)
	Tans and never burns	5.6% (26)	10.7% (35)	12.1% (29)	8.8% (29)
2. Does your skin have freckles?	Yes	40.6% (185)	33.1% (107)	27.9% (67)	35.2% (359)
	No	59.4% (271)	66.3% (214)	72.1% (173)	66.6% (658)
3. How many moles do you have?	None	8.1% (36)	10.3% (33)	26.9% (61)	13.1% (130)
	Less than 20	34.8% (162)	43.9% (140)	37.0% (84)	39.0% (386)
	More than 20	55.3% (245)	45.8% (146)	36.1% (82)	47.8% (473)
4. Do you have large moles with an irregular edge and/or colour?	Yes	29.0% (131)	13.6% (44)	25.0% (57)	23.1% (232)
	No	30.5% (138)	72.5% (235)	56.1% (128)	49.9% (501)
	Don't know	40.5% (183)	13.9% (45)	18.9% (43)	27.0% (271)
5. What is your natural hair colour?	Black/brown	85.5% (396)	84.0% (273)	89.0% (211)	85.9% (880)
	Blond	11.0% (51)	12.9% (42)	9.7% (23)	11.3% (116)
	Red	3.5% (16)	3.1% (10)	1.3% (3)	2.8% (29)
6. What is the colour of your skin?	White	66.3% (305)	64.0% (210)	70.1% (169)	66.7% (684)
	Brown/yellow	32.9% (151)	33.9% (110)	29.0% (70)	32.3% (331)
	Black	0.9% (4)	1.2% (4)	0.8% (2)	1.0% (10)
7. How many times in your life have you had a bad sunburn?	Never	19.9% (92)	16.9% (55)	30.5% (73)	21.4% (220)
	Once or twice	44.7% (207)	45.7% (149)	44.4% (106)	44.9% (462)
	3 or more	35.4% (164)	37.4% (122)	25.1% (60)	33.7% (346)

edge and/or colour, and therefore do not check their moles. This confirms that 27% of our total sample (n = 271) are at risk and do not check their moles.

Domain 2: "Level of Concern"

The responses given to the items in the Domain of "Level of Concern" did not vary much across the three regions, despite Rome included the general public and Genoa and Messina included people sitting in the waiting rooms of dermatology clinics. However, the samples from Genoa and Messina were approximately 15% more likely to check their skin for moles than the Rome sample. In addition, over 80% (n = 831) of the total sample had not consulted a physician in the past 6 months to have their moles checked, and over 34% (n = 351) declared that they would unlikely see a physician in the next 6 months (Tab. III).

Domain 3: "Protective Behaviour"

The level "Protective Behaviour" did not vary significantly between Rome and the other two regions. Over 17.1% (n = 79) of the sample in the North used sunlamps and over 27% (n = 62) in the South did not protect their skin from the sun. In all the regions, very few people used protective clothing (3.2%), stayed in the shade (2.7%), and avoided sun during the warmest hours of the day (0.6%). Finally, about one third of the total population (n = 335) would seek medical advice 'When possible' if they noticed a new mole (Tab. IV).

Domain 4: "Knowledge about Melanoma"

Unlike the previous three domains, this domain on "Knowledge about Melanoma" were asked to reply 'yes' or 'no' to each question, but only one answer

was correct (Tab. V). Respondents also had the option to reply 'Don't know' if they were not sure. Obviously, respondents were not aware which one was correct.

Over 40% replied 'don't know' in 11 of the 18 items. Interestingly, the Rome general public sample scored better (3.6) than Messina (2.91), and Genoa (2.9). Therefore, being a dermatology patient does not necessarily entail higher levels of melanoma knowledge.

In addition, two-thirds of our sample did not know that 'Having blue eyes', 'fair hair', and 'red hair', were risk factors for the development of melanoma. With regard to 'Getting sunburned' and 'Prolonged exposure to the sun', respectively 15.1% (n = 154) and 16.9% (n = 170) gave the wrong answer or 'did not know' their risky nature.

Regarding misconceptions about melanoma, 36.4% (n = 359) replied that it can be completely prevented and 44.3% (n = 437) did not know; 29.8% (n = 289) did not know if it could heal without treatment; and, 32.8% (n = 324) did not know that it would lead to death if not treated. (Tab. V)

Discussion

No statistically significant differences were found between Northern, Central and Southern Italy. However, the mean scores showed that there was a moderate level of "Personal Risk" (mean score = 10.5; range from -2 to 22), a moderate "Level of Concern" (mean score 4.8; range from 1 to 10), a sufficient level of "Protective Behaviour" (mean score = 6.8; range from 3 to 12), and a poor level of "Melanoma Knowledge" (mean score = 3.1; range

Tab. III. A comparison between Northern (Genoa), Central (Rome), and Southern (Messina) Italy with regard to the number of responses given to the items in the Domain of "Level of Concern".

Domain 2 "Level of concern"	Response items	Genoa % (n)	Rome % (n)	Messina % (n)	Total % (n)
Have you consulted your GP about any moles or skin blemishes in the past 6 months?	Yes	12.7% (59)	24.2% (79)	26.0% (63)	19.5% (201)
	No	87.3% (405)	75.8% (247)	74.0% (179)	80.5% (831)
How likely are you to see your GP about any moles or skin blemishes in the next 6 months?	Very likely	18.1% (83)	20.3% (66)	22.3% (53)	19.8% (202)
	Likely	38.9% (178)	23.7% (77)	29.8% (71)	31.9% (326)
	Not likely	32.5% (149)	38.2% (124)	32.8% (78)	34.4% (351)
	Very unlikely	10.5% (48)	17.8% (58)	15.1% (36)	13.9% (142)
Do you check your skin for moles?	Yes	73.9% (342)	60.3% (196)	76.3% (184)	70.2% (722)
	No	26.1% (121)	39.7% (129)	23.7% (57)	29.8% (307)
If yes, how often?	More than once a month	20.3% (71)	16.3% (33)	28.0% (51)	21.1% (155)
	Once a month	27.4% (96)	25.7% (52)	23.1% (42)	25.9% (190)
	Once or twice a year	52.3% (183)	57.9% (117)	48.9% (89)	53.9% (389)

Tab. IV. "Protective Behaviour": a comparison between Northern (Genoa), Central (Rome), and Southern (Messina) Italy with regard to the number of responses given to the items in the Domain of "Protective Behaviour".

Domain 3 "Protective Behaviour"	Response items	Genoa % (n)	Rome % (n)	Messina % (n)	TOTAL % (n)
Do you try to get a suntan when at home or on holiday?	Yes	74.3% (338)	66.5% (216)	67.4% (157)	70.2% (711)
	No	25.7% (117)	33.5% (109)	32.6% (76)	29.8% (302)
Do you use a sunlamp (tanning bed)?	Yes	17.1% (79)	9.9% (32)	9.4% (22)	13.1% (133)
	No	82.9% (382)	90.1% (291)	90.6% (213)	86.9% (886)
If yes, how frequently do you use the sunlamp (tanning bed)?	Rarely	56.4% (44)	52.4% (22)	96.0% (24)	62.1% (90)
	1-3 times a year	35.9% (28)	28.6% (12)	4.0% (1)	28.3% (41)
	Monthly	5.1% (4)	16.7% (7)	0% (0)	7.6% (11)
	Weekly or more often	2.6% (2)	2.4% (1)	0% (0)	2.1% (3)
Do you try to protect your skin when at home or on holiday?	Yes,	84.8% (392)	77.6% (249)	72.9% (167)	79.8% (808)
	No	15.2% (70)	22.4% (72)	27.1% (62)	20.2% (204)
If yes, how?	Sunscreen	70.8% (363)	67.7% (221)	56.3% (136)	70.5% (720)
	Protective clothing	2.9% (14)	4.3% (14)	1.6% (4)	3.2% (32)
	Stay in the shade	2.2% (11)	2.4% (8)	3.6% (8)	2.7% (27)
	Avoid sun at its peak	1.0% (5)	0% (0)	0.4% (1)	0.6% (6)
In the last 5 years, how many times have you taken a holiday in a sunny location?	Never	9.0% (41)	6.1% (20)	22.7% (51)	11.1% (112)
	1-2 times	21.6% (98)	14.4% (47)	18.7% (42)	18.6% (187)
	3-4 times	24.7% (112)	24.2% (79)	11.6% (26)	21.6% (217)
	5 or more times	44.7% (203)	55.2% (180)	47.1% (106)	48.7% (489)
If you noticed a new mole, what would you do?	Visit your GP	46.7% (210)	54.7% (175)	60.9% (134)	52.4% (519)
	Ask partner or a friend to look at it	22.9% (103)	17.5% (56)	15.0% (33)	19.4% (192)
	Ignore it	30.4% (137)	27.8% (89)	24.1% (53)	28.2% (279)
How soon would you seek medical advice if you noticed a new mole?	Within 1 month	39.2% (177)	42.2% (137)	52.9% (118)	43.2% (432)
	Within 2 months	4.7% (21)	8.6% (28)	6.7% (15)	6.4% (64)
	Within 3 months	16.9% (76)	16.3% (53)	9.9% (22)	15.1% (151)
	When possible	37.3% (168)	31.7% (103)	28.7% (64)	33.5% (335)
	Never	2.0% (9)	1.2% (4)	1.8% (4)	1.7% (17)

from -6 to 20) throughout Italy, where Rome obtained the highest mean score (3.60), followed by Messina (2.91), and Genoa (2.90) thus confirming the results of similar studies [35, 36]. Moreover, these results highlighted the need for a wide-scale intervention based on social

marketing [9, 10]). Therefore, we decided to apply the key findings of the present study to the HBM. The resulting model of health beliefs of Italians about sun safety was then incorporated into a conceptual framework linking the perceptions and health opinions with social marketing

Tab. V. The comparison between Genoa, Rome and Messina in Domain 4: "Knowledge about Melanoma".

Domain 4 "Knowledge about Melanoma"	Response Items	Genoa % (n)	Rome % (n)	Messina % (n)	Total % (n)
Which of the following 12 factors increase the risk of developing a melanoma?					
a) Having a lot of moles	Yes (correct)	48.8% (225)	56.1% (183)	58.4% (128)	53.3% (536)
	No (wrong)	18.9% (87)	15.6% (51)	17.4% (38)	17.5% (176)
	Don't know	32.3% (149)	28.2% (92)	24.2% (53)	29.2% (294)
b) A particular diet	Yes (wrong)	4.6% (21)	8.3% (27)	11.5% (24)	7.2% (72)
	No (correct)	50.8% (223)	54.9% (179)	52.6% (110)	52.5% (522)
	Don't know	44.7% (205)	36.8% (120)	35.9% (75)	40.2% (400)
c) A fair complexion	Yes (correct)	68.1% (314)	74.2% (242)	71.2% (153)	70.8% (709)
	No (wrong)	8.0% (37)	6.4% (21)	9.8% (21)	7.9% (79)
	Don't know	23.9% (110)	19.3% (63)	19.1% (41)	21.4% (214)
d) Drinking alcohol regularly	Yes (wrong)	8.1% (37)	11.3% (37)	13.0% (27)	10.2% (101)
	No (correct)	36.8% (169)	45.4% (93)	44.7% (93)	41.3% (410)
	Don't know	55.1% (253)	43.3% (141)	42.3% (88)	48.5% (482)
e) Getting sunburned	Yes (correct)	82.1% (380)	88.0% (286)	85.8% (194)	84.8% (860)
	No (wrong)	3.2% (15)	2.8% (9)	6.2% (14)	3.7% (38)
	Don't know	14.7% (68)	9.2% (30)	8.0% (18)	11.4% (116)
f) Prolonged exposure to the sun	Yes (correct)	79.4% (365)	87.4% (284)	85.4% (187)	83.1% (836)
	No (wrong)	5.4% (25)	3.1% (10)	5.9% (13)	4.8% (48)
	Don't know	15.6% (72)	9.5% (31)	8.7% (19)	12.1% (122)
g) Smoking	Yes (wrong)	22.7% (105)	28.2% (92)	34.0% (73)	26.9% (270)
	No (correct)	22.3% (103)	28.8% (94)	28.8% (62)	25.8% (259)
	Don't know	55.0% (254)	42.9% (140)	37.2% (80)	47.3% (474)
h) Having blue eyes	Yes (correct)	16.7% (77)	17.8% (58)	10.0% (21)	15.7% (156)
	No (wrong)	36.1% (166)	40.9% (133)	50.7% (107)	40.8% (406)
	Don't know	47.2% (217)	41.2% (134)	39.3% (83)	43.6% (434)
i) Having green eyes	Yes (wrong)	11.7% (54)	14.8% (48)	6.3% (13)	11.6% (115)
	No (correct)	38.0% (175)	40.6% (132)	52.2% (108)	41.8% (415)
	Don't know	50.2% (231)	44.6% (145)	41.5% (86)	46.6% (462)

Continues

Follows

Tab. V. The comparison between Genoa, Rome and Messina in Domain 4: "Knowledge about Melanoma".

Domain 4 "Knowledge about Melanoma"	Response Items	Genoa % (n)	Rome % (n)	Messina % (n)	Total % (n)
Which of the following 12 factors increase the risk of developing a melanoma?					
j) Having red hair	Yes (correct)	26.9% (124)	40.6% (131)	22.0% (46)	30.3% (301)
	No (wrong)	26.0% (120)	21.4% (69)	38.3% (80)	27.1% (269)
	Don't know	47.1% (217)	38.1% (123)	39.7% (83)	42.6% (423)
k) Having fair hair	Yes (correct)	23.8% (110)	31.3% (102)	19.2% (40)	25.3% (252)
	No (wrong)	29.8% (138)	25.5% (83)	40.4% (84)	30.6% (305)
	Don't know	46.4% (215)	43.3% (141)	40.4% (84)	44.1% (440)
l) Having dark hair	Yes (wrong)	3.9% (18)	1.2% (4)	3.9% (8)	3.0% (30)
	No (correct)	51.0% (235)	55.5% (181)	57.8% (119)	53.9% (535)
	Don't know	45.1% (208)	43.3% (141)	38.3% (79)	43.1% (428)
How worried would you be if you noticed that a mole...					
a) became irregular in shape?	Very worried	42.3% (196)	44.2% (144)	48.4% (109)	44.3% (449)
	Worried	49.2% (228)	43.3% (141)	44.0% (99)	46.2% (468)
	Not very worried	6.5% (30)	11.3% (16)	7.1% (16)	8.2% (83)
	Not worried	1.9% (9)	1.2% (4)	0.4% (1)	1.4% (14)
b) became irregular in colour?	Very worried	44.3% (204)	43.7% (142)	47.3% (97)	44.7% (443)
	Worried	47.3% (218)	44.3% (144)	44.9% (92)	45.8% (454)
	Not very worried	6.7% (31)	10.5% (34)	7.3% (15)	8.1% (80)
	Not worried	1.5% (8)	1.5% (5)	0.5% (1)	1.4% (14)
c) grew in size?	Very worried	48.5% (224)	48.3% (157)	51.7% (106)	49.1% (487)
	Worried	40.3% (186)	38.5% (125)	39.5% (81)	39.5% (392)
	Not very worried	9.1% (42)	12.3% (40)	7.8% (16)	9.9% (98)
	Not worried	2.2% (10)	0.9% (3)	1.0% (2)	1.5% (15)
Can a melanoma...					
a) be completely prevented?	Yes (wrong)	34.3% (157)	36.3% (118)	41.2% (84)	36.4% (359)
	No (correct)	19.0% (87)	19.4% (63)	20.1% (41)	19.4% (191)
	Don't know	46.7% (214)	44.3% (144)	38.7% (79)	44.3% (437)
b) heal without therapy?	Yes (wrong)	5.1% (23)	5.6% (18)	0.5% (1)	4.3% (42)
	No (correct)	59.2% (267)	67.4% (217)	78.8% (156)	65.9% (640)
	Don't know	35.7% (161)	27.0% (87)	20.7% (41)	29.8% (289)

Continues

Follows

Tab. V. The comparison between Genoa, Rome and Messina in Domain 4: "Knowledge about Melanoma".

Domain 4 "Knowledge about Melanoma"	Response Items	Genoa % (n)	Rome % (n)	Messina % (n)	Total % (n)
Can a melanoma...					
c) be cured if treated early?	Yes (correct)	77.8% (357)	76.6% (249)	81.3% (174)	78.2% (780)
	No (wrong)	1.7% (8)	2.2% (7)	2.8% (6)	2.1% (21)
	Don't know	20.5% (94)	21.2% (69)	15.9% (34)	19.7% (197)
d) lead to death if not treated?	Yes (correct)	62.7% (288)	65.4% (212)	65.0% (134)	64.1% (643)
	No (wrong)	3.1% (14)	1.2% (4)	6.3% (13)	3.1% (31)
	Don't know	34.2% (157)	33.3% (108)	28.6% (59)	32.8% (324)
In men, the commonest part of the body to find a melanoma is:	The face (wrong)	3.9% (18)	3.7% (12)	10.7% (23)	5.3% (53)
	The back (correct)	30.9% (141)	30.8% (100)	23.7% (51)	29.3% (292)
	The leg (wrong)	2.9% (13)	4.0% (13)	2.8% (6)	3.2% (32)
	Other?	0.7% (3)	1.8% (6)	2.3% (5)	1.4% (14)
	Don't know	61.6% (281)	59.7% (194)	60.5% (130)	60.7% (605)
In women, the commonest part of the body to find a melanoma is:	The face (wrong)	8.3% (38)	5.6% (18)	13.7% (29)	8.5% (85)
	The back (wrong)	13.7% (63)	12.3% (40)	15.6% (33)	13.7% (136)
	The leg (correct)	9.8% (45)	12.7% (41)	5.7% (12)	9.8% (98)
	Other?	2.0% (9)	2.8% (9)	3.8% (8)	2.6% (26)
	Don't know	66.2% (304)	66.7% (216)	61.3% (130)	65.3% (650)

constructs. Table VI shows the application of the study's findings to the health belief model.

Increasing awareness through improving the factual knowledge people have about melanoma is insufficient to facilitate behaviour change alone. Interventions need to motivate and inform perceptions, as well as educate and provide realistic ways to help people adopt healthier behaviours. The use of social marketing techniques to promote the prevention of melanoma has been found to be effective in other countries [13] and has proven to be an effective theory to base skin health interventions upon. In young people, the technique of 'channel analysis' can assist in determining the best ways to deliver health messages – for example, the use of social media to inform and educate [15] and also using social media to link skin health activities with role models young people admire [12]. Social marketing theory also requires health promoters to be realistic and pragmatic about what type of messages they are championing, for instance, the social pressure to be tanned is so ingrained in Italy that a message focussed on avoiding the sun completely is unlikely to resonate. It may be more beneficial to promote gradual tanning

and how skin awareness can help build a 'safer' tan. Also, recognising that social marketing and health research tells us that overly negative messages can be less effective than more positive ones – framing 'safer' tanning alongside the message that it provides a longer lasting tan may be helpful [14].

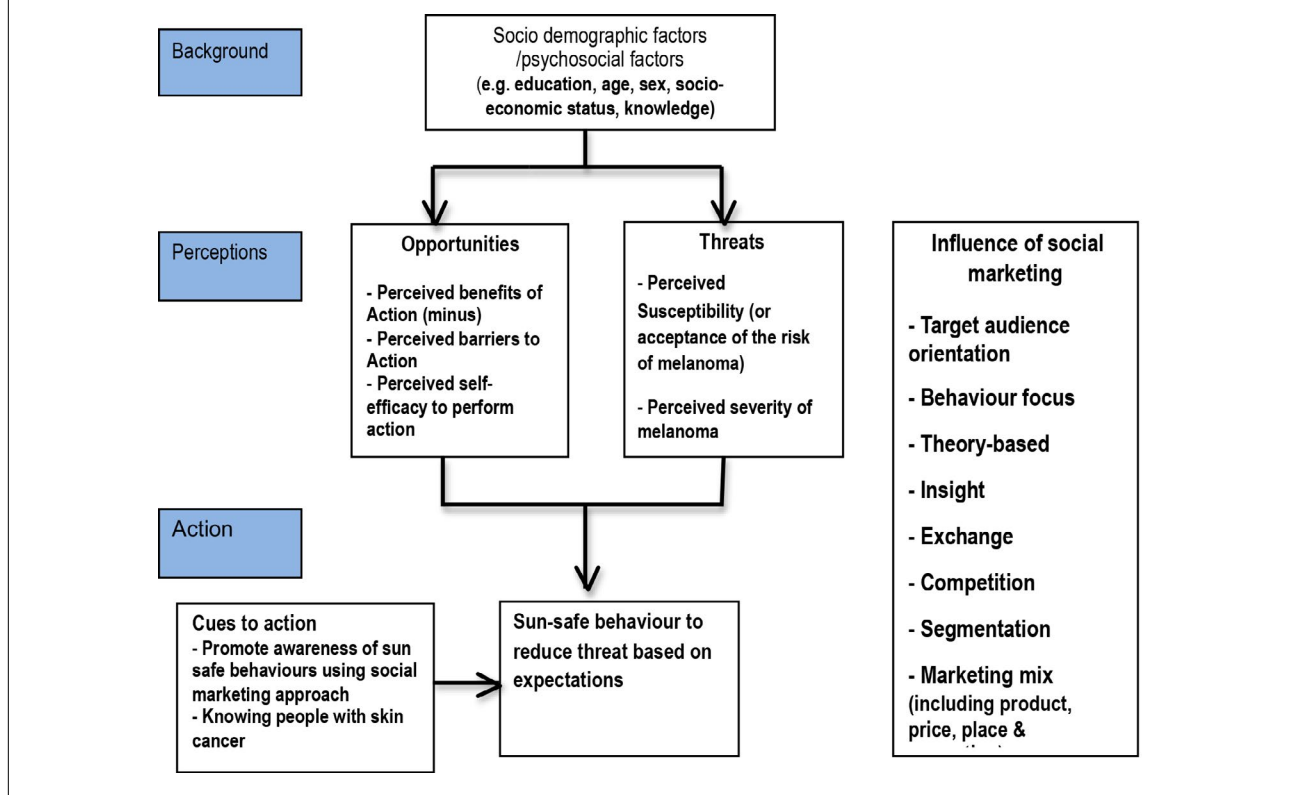
The development of a conceptual framework offers an attempt to understand and assess the key issues relating to the prevention of melanoma by adopting a social marketing approach. The framework represents and conveys factors that foster or hinder the prevention of cutaneous melanoma and that can be used to inform and shape a social marketing response to this issue (Fig. 1).

This conceptual framework may be used to understand the likelihood of Italians carrying out sun-safe protective actions. Community-level social marketing interventions can benefit from utilising the framework developed as it provides an understanding of the target audience's perceptions and beliefs, enabling a real behaviour change to occur. The framework enables us to address the desired behaviour intention as a product to be 'sold' to the target market, while

Tab. VI. Application of the study findings to the Health Belief Model (HBM).

HBM concepts	Definition	Application of study findings
1. Perceived susceptibility	One's belief of the chances of getting a condition	<ul style="list-style-type: none"> – Low levels of concern – High levels of personal risk particularly amongst women – and those less well educated – Low level of protective behaviour
2. Perceived severity	One's belief of how serious a condition and its consequences are	<ul style="list-style-type: none"> – Lack of knowledge about melanoma
3. Perceived benefits	One's belief in the efficacy of the advised action to reduce risk or seriousness of impact	<ul style="list-style-type: none"> – Reduce risk of developing a melanoma – Early detection of melanoma
4. Perceived barriers	One's belief in the tangible and psychological costs of the advised behaviour	<ul style="list-style-type: none"> – Positive perceptions and priority of a sun tan – Hassle of protection (e.g. sunscreen hats covering up) – Being outdoors
5. Cues to action	Strategies to activate "readiness"	<ul style="list-style-type: none"> – Promote awareness of sun safe behaviours using social marketing approach – Knowing people with skin cancer
6. Self-efficacy	Confidence in one's ability to take action	<ul style="list-style-type: none"> – Ability to carry out sun-safe behaviours – Use the correct sunscreen and ability to apply correctly – Be able to check moles/freckles effectively
Modifying variables	Influences on perceptions	<ul style="list-style-type: none"> – Age – Gender – Psychosocial factors (job, education) – Family member with melanoma or knowing someone with a melanoma – Knowledge about melanoma – Direct experience of melanoma

Fig. 1. A conceptual framework illustrating the influence of social marketing on the constructs of the HBM in relation to skin cancer prevention in Italy.



encompassing necessary areas, such as promotional strategies and products development to bring about behaviour change. This strategy could be a direct intervention to either reduce the desire for a tan, increase the social acceptability of adopting specific

sun protection practices, or even alter the social norm of complacency. A risk reduction strategy could also include the use of tangible products, such as a fake tan, to provide safer alternatives for hard-to-change behaviours.

LIMITATIONS

This study did not explore the reasons of the sample's behaviours. Moreover, no qualitative data about self-efficacy issues were collected to understand, for instance, if people felt they correctly used sunscreen and checked their moles. Finally, apart from comparing the general public with those in the dermatology waiting rooms, no other potential confounding variables were considered.

Conclusions

In the last 20 years, the incidence of melanoma has increased by over 4% a year [2] and the moderate mean scores for 'Personal Risk', 'Level of Concern', and 'Protective Behaviour' combined with the poor levels of 'Melanoma Knowledge' are by no means encouraging. In fact, many respondents showed a lack of skin awareness and a misconception of the deadly nature of melanoma. This confirms that more still needs to be done to implement and promote sun-safe behaviours. Therefore, there is an ethical imperative to promote the importance of adopting protective behaviors. A social marketing intervention based on the Health Belief Model could offer an effective solution for a wide-scale intervention to 'nudge' and equip people with the motivation to proactively undertake preventive behaviours.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

The individual contributions of authors to the manuscript are as follows:

GA, AB, LG, EC, SPC, AP and LS contributed to the conception and the design of this study; GA, RW, MH, AB, MZ, GC, and LS contributed to data collection, analysis, and interpretation; GA, RW, MH, LG, EC, SPC, AP, and LS have been involved in drafting, editing and revising critically this manuscript. All authors have read and approved the final manuscript.

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