








## SHORT REPORT

# The prevalence of skin diseases in Greece, impact on quality of life and stigmatization: A population-based survey study

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## Abstract

**Background:** There is no population-based evidence on the prevalence and impact of skin diseases in Greece.

**Objectives:** To describe the prevalence of 12 main skin diseases and their impact on quality of life (QoL) and feelings of stigmatization in the Greek population.

**Methods:** A population-based survey in an adult Greek representative sample was carried out as part of the multinational 'EADV burden of skin diseases study'. Quality of life (QOL) was measured using the Dermatology Life Quality Index (DLQI) and the Visual Analogue Scale (VAS) from the EuroQoL-5D (EQ-5D) questionnaires.

**Results:** In 1010 participants, 47.8% ( $n = 483$ ) declared at least one skin disease or condition or skin-related unpleasant sensation in the last 12 months. Fungal skin infection was reported with the higher prevalence (7.5%),

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followed by alopecia (5.7%), atopic dermatitis (5%), acne (3.6%), sexually transmitted diseases (2.7%), psoriasis (2.2%) chronic urticaria (1.5%), rosacea (1.3%), nonmelanoma skin cancer (1.5%), vitiligo (0.6%), cutaneous melanoma (0.6%) and hidradenitis suppurativa (0.3%). Mean VAS-EQ, 5D and DLQI scores were 77.8 and 2.2, respectively. Among those reporting at least one skin problem, 68.1% reported an impact of the skin condition on their personal life and 51% reported an impact on time to take care of themselves. Regarding the impact on work-life decisions, 22.2% reoriented their professional activity, 13% were refused a professional offer, 22.2% did not get the job they hoped to and 16.7% chose their work with their skin problem in mind. Regarding feelings of stigmatization, 12% felt left out/rejected by others, 6.6% were refused access to leisure facilities and 9.8% reported the impression to be looked at with disgust.

**Conclusions:** Our population-based study provides new information on the prevalence of skin diseases in the Southern European country of Greece and highlights the impact of prevalent skin disease on life-altering decisions and stigmatization.

#### KEYWORDS

Greece, prevalence, quality of life, skin diseases, stigmatization, survey, work life

## INTRODUCTION

Skin conditions are the most frequent reason for consultation in general practice and may negatively impact patients' quality of life (QoL).<sup>1,2</sup> In the recent population-based survey on the 'Burden of skin diseases in Europe' initiated and supported by the EADV, 50.9% of participants reported having had at least one skin disease, condition or skin-related symptom during the previous 12 months.<sup>3</sup> Population-based data on the prevalence of skin conditions in the Greek adult population are lacking. We are aware of only one study reporting the 12-month prevalence of atopic dermatitis ranging from 1.7% to 6.4%.<sup>4</sup> The knowledge of the prevalence of skin conditions in Greece may add useful information for public health interventions, including targeted public education and awareness campaigns on those diseases with the higher prevalence. Such an example is Australia, with a high prevalence of cutaneous melanoma that has focused public health resources on rigorous sun exposure prevention programs, applying complete legislation ban on solarium, public awareness campaigns, screening to detect melanoma early, which have resulted in a reduction in the mortality associated with melanoma.<sup>5</sup> Furthermore, the prevalence of skin diseases is different across Northern or Southern European countries,<sup>6</sup> while the burden and stigmatization related to skin diseases may vary in different cultural settings and with social norms across countries.

The aim of this study was to investigate the prevalence of 12 main skin conditions and to describe their burden on QoL and the occurrence of patients' feeling of stigmatization. In a representative sample of the population in Greece included in the EADV 'Burden of skin diseases in Europe'.

## METHODS

This study investigated the Greek patient sample included in the EADV multinational, cross-sectional survey 'Burden of skin diseases in Europe' conducted on a representative sample of the adult general populations of 27 European countries, from 10 November 2020 to 5 August 2021.<sup>3</sup> Data were collected using a web-based online survey conducted by a polling institute (HC Conseil, Paris), by a stratified, proportional sampling with a replacement design.<sup>4</sup> Since the study used anonymized survey data, institutional review board approvals were not required. Data collections were done in respect of ethical codes of the European Society for Opinion and Marketing Research (ESOMAR) in compliance with the GDPR rules.<sup>3</sup>

The questionnaire used for this survey has been detailed previously.<sup>3</sup> In brief, it consisted of two modules: (1) questions asked to the whole sample and (2) questions asked to those reporting at least one skin

condition during the previous 12 months. The first module collected information on the presence of one or more skin condition or disease or unpleasant skin sensation during the previous 12 months from a given list (Supporting Information: Table S1). QoL was assessed by the VAS from EuroQol-5D questionnaire (EQ. 5D), which measures self-rated health state from '0' (worst imaginable health state) to '100' (best imaginable health state). The second module, included questions on the impact of the disease on patients' personal life, work life decisions and daily life, on feelings of stigmatization and the Dermatology Life Quality Index (DLQI) questionnaire.<sup>7</sup>

In statistical analysis, the total population of individuals suffering from each skin condition was calculated by direct extrapolation of the proportions from the proportionally stratified sample. Subgroup analyses were performed by gender and age. The risk of error of type 1 (a) was set at 0.05. The statistical analyses were carried out using the HARMONIE 1.7 software (registration number 4000937).

## RESULTS

The study population consisted of 1010 participants, 501 (49.6%) of whom were men. The age distribution was: 10.7% '18–25 years', 53.3% '26–54 years' and 36% '≥55 years'. In total, 483 participants (47.8%) reported at least

one skin disease or condition or skin-related unpleasant sensation in the last 12 months, 462 (45.7%) at least one skin disease or condition and 449 (44.4%) at least one disease or condition excluding mole cancer screening. On average, the participants declared 2.7 skin diseases (standard deviation, SD = 3.1).

In our population-based sample, among the 12 main skin diseases, there were eight skin diseases with a prevalence higher than 1%: fungal skin infection (7.5%), alopecia/hair loss (5.7%), atopic dermatitis/eczema (5%), acne (3.6%), sexually transmitted disease (2.7%), psoriasis (2.2%), chronic urticaria (1.5%) and rosacea (1.3%). The remaining four skin diseases included nonmelanoma skin cancer (0.7%), vitiligo (0.6%), melanoma skin cancer (0.6%) and hidradenitis suppurativa (0.3%). Fungal skin infection was the more frequently reported skin disease with an estimated prevalence of 7524 per 100,000 persons (95% CI: 5897–9151). The overall prevalence of the 12 main skin diseases as well as the prevalence by gender are presented in Table 1. Eczema affected 7.5% of women and 2.6% of men, acne affected 4.5% of women and 2.6% of men, while hidradenitis suppurativa was reported in 0.2% of women and 0.4% of men. A comparison with the prevalence reported in Europe in the EADV 'Burden of skin diseases in Europe' is shown in Table 2.

The prevalence of the investigated skin diseases for the three age groups is presented in Figure 1. The prevalence of acne, atopic dermatitis and STD decreased by age, while the prevalence of psoriasis was higher in

**TABLE 1** Prevalence of the 12 main skin diseases in a representative sample of 1010 individuals of the Greek population aged 18 years or over, estimated prevalence and extrapolation in millions of individuals and prevalence according to gender.

Disease	<i>n</i>	% (ME)	Estimated prevalence per 100,000 persons [95% CI]	Extrapolation in millions of individuals	Men % (ME)	Women % (ME)
Fungal skin infection	76	7.5	7524 [5897–9151]	0.65	7.6 (2.3)	7.5 (2.3)
Alopecia/hair loss	58	5.7	5742 [4307–7177]	0.50	5.4 (2.0)	6.1 (2.1)
Atopic dermatitis/eczema	51	5.0	5049 [3699–6399]	0.44	2.6 (1.4)	7.5 (2.3)
Acne	36	3.6	3564 [2420–4707]	0.31	2.6 (1.4)	4.5 (1.8)
Sexually transmitted diseases	27	2.7	2673 [1678–3668]	0.23	2.8 (1.4)	2.6 (1.4)
Psoriasis	22	2.2	2178 [1277–3078]	0.19	1.2 (0.9)	3.1 (1.5)
Chronic urticaria	15	1.5	1485 [739–2231]	0.13	1.2 (0.9)	1.8 (1.1)
Rosacea	13	1.3	1287 [591–1982]	0.11	1.0 (0.9)	1.6 (1.1)
Nonmelanoma skin cancers	7	0.7	693 [181–1204]	0.06	0.6 (0.7)	0.8 (0.8)
Vitiligo	6	0.6	594 [120–1067]	0.05	0.2 (0.4)	1.0 (0.9)
Melanoma skin cancers	6	0.6	594 [120–1067]	0.05	0.8 (0.8)	0.4 (0.5)
Hidradenitis suppurativa	3	0.3	297 [–38–632]	0.03	0.4 (0.5)	0.2 (0.4)

Abbreviation: ME, 95% margin of error.

**TABLE 2** Summary of the prevalence of the 12 main skin diseases overall and by gender in the current study in Greece, in the multinational 'EADV burden of skin diseases' study in 27 European countries<sup>3</sup> and in a population-based study in France.<sup>8</sup>

Findings	Population-based prevalence			Population-based prevalence by gender			
	Current study, Greece	27 European countries <sup>a</sup>	France	Current study, Greece		27 European countries	
				Men	Women	Men	Women
At least one disease, condition or symptom in the last 12 months	47.8%	50.9%	NR				
At least one disease or condition in the last 12 months	45.7%	47.2%	NR				
At least one disease or condition in the last 12 months, excluding mole check	44.4%	43.4%	NR				
Prevalence by skin disease							
Fungal skin infection	7.5%	8.9%	NR	7.6%	7.5%	8.9%	8.9%
Alopecia/hair loss	5.7%	5.1%	NR	5.4%	6.1%	4.5%	5.8%
Atopic dermatitis/eczema	5.0%	5.5%	4.5%	2.6%	7.5%	4.4%	6.6%
Acne	3.6%	5.4%	NR	2.6%	4.5%	4.2%	6.5%
Sexually transmitted diseases	2.7%	2.8%	NR	2.8%	2.6%	3.6%	2.0%
Psoriasis	2.2%	3.9%	4.42%	1.2%	3.1%	4.2%	3.7%
Chronic urticaria	1.5%	1.0%	NR	1.2%	1.8%	0.9%	1.0%
Rosacea	1.3%	2.0%	NR	1.0%	1.6%	1.3%	2.7%
Nonmelanoma skin cancers	0.7%	1.1%	NR	0.6%	0.8%	1.4%	0.8%
Vitiligo	0.6%	0.8%	0.46%	0.2%	1.0%	0.9%	0.7%
Melanoma skin cancers	0.6%	0.6%	NR	0.8%	0.4%	0.8%	0.4%
Hidradentis suppurativa (recurrent abscesses or painful cysts in armpits, groins, buttocks, etc.)	0.3%	0.6%	0.15%	0.4%	0.2%	0.7%	0.5%

Abbreviation: NR, not reported.

<sup>a</sup>24 countries belonging to the European Union plus United Kingdom, Switzerland and Norway.

the age group  $\geq 55$  years old. The prevalence of vitiligo did not show differences with age.

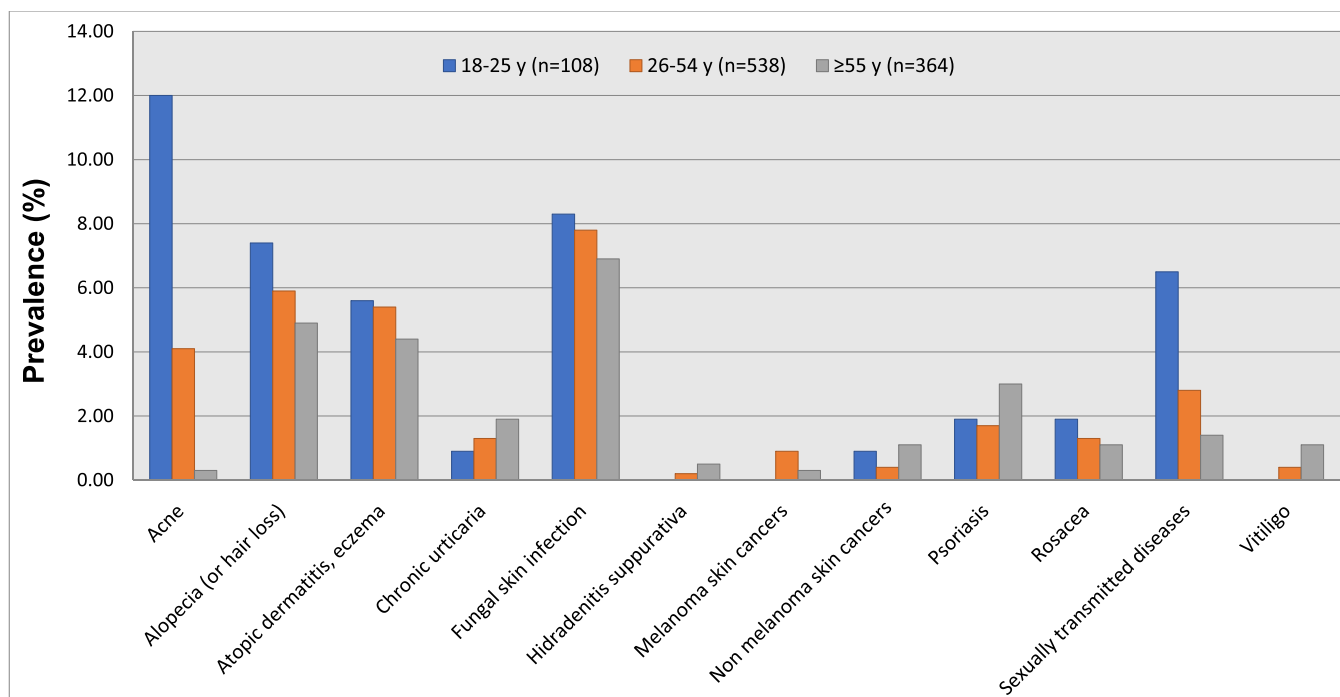
QoL decreased with increasing number of skin conditions. Mean VAS-EQ. 5D score was 77.8 when one skin condition was present, 68.0 for two and 65.4 for three or more conditions. Mean DLQI score was 2.2 (translating to a small effect on patient's life), 3.4 (translating to a small effect on patient's life) and 7.3 (translating to a moderate effect on patient's life) for one, two and for three or more conditions, respectively (data not shown).

The questions on the impact of the disease on patients' personal life, work life decisions or daily life and on stigmatization are presented in Table 3. Among those reporting at least one skin problem, 68.1% reported an impact of the skin condition on their personal life and 55.6% reported an impact on their work life. Regarding the impact on personal life, 12.7% reported a high impact

that disrupted their life, while 31.3% reported a moderate impact that they could control, and 20.3% a mild impact.

Regarding the impact on work life, 16.7% reported they adapted working hours, 22.2% reoriented their professional activity, 13% was refused a professional offer, 22.2% did not get the job they hoped to, and 16.7% chose their work with their skin problem in mind. Regarding the impact on daily life, among those reporting at least one skin problem or unpleasant skin sensation, an impact on daily life regarding sleeping difficulty, feeling tired, on time to take care of oneself, and on time to take care of one's family, was reported by 40.8%, 48.4%, 51% and 52.3% respectively (Table 3).

Regarding feelings of stigmatization, 2% strongly agreed and 9.9% agreed they felt left out/rejected by others; 2% strongly agreed and 4.6% agreed they had been denied access in leisure facilities; 2.6% strongly agreed



**FIGURE 1** Prevalence of the 12 main skin diseases in the population-based Greek sample ( $n = 1010$ ), by age group.

and 7.2% agreed they had the impression to be looked at with disgust' (Table 3).

## DISCUSSION

This population-based survey study reports the prevalence of the 12 more commonly reported skin diseases in Greece, as well as the considerable impact of skin disease on the patients' life and potential of stigmatization. In our study, 47.8% of participants reported at least one skin disease or condition or skin-related unpleasant sensation, and 44.4% at least one skin disease or condition in the last 12 months. In 2019 there were 8,702,000 adult inhabitants in Greece. This translates to more than 3.8 million adult people in a year affected from a skin condition in Greece during the study period. The reported prevalence in our study is similar to the prevalence across all 27 European countries (50.9%).<sup>3</sup>

Although the epidemiology of skin cancers, especially melanoma, is well documented in national registries,<sup>9</sup> and the prevalence of certain skin diseases including psoriasis and hidradenitis suppurativa in Western European and Scandinavian countries, the United States and Australia<sup>10</sup> has been reported, national population-based prevalence data on skin diseases are limited. In a population-based study in the French population on five skin diseases ('Objectifs peau'),<sup>8</sup> the prevalence of atopic dermatitis (4.5%) and of vitiligo (0.46%) were similar to

our study in Greece, while there was a higher prevalence of psoriasis (4.4%), and a lower prevalence of hidradenitis suppurativa (0.15%) (Table 2). The systematic review and meta-analysis of prevalence of HS by Jfri et al., included studies from Europe (Western European and Scandinavian countries), the United States, and Australia.<sup>10</sup> They reported a 0.4% prevalence, in line with our study finding of 0.3% prevalence. This systematic review reported that gender was not associated with pooled prevalence. Differences in our study may be explained by underlying differences in the included population, that is, smoking status or BMI, which may affect the prevalence of HS and were not collected. Differences in the prevalence of skin diseases across countries may be explained by differences of included participants, that is, inclusion of younger participants ( $\geq 15$  years) in the French study,<sup>8</sup> as well as the observation that the prevalence of skin diseases in Northern countries is generally higher than in Southern European countries.<sup>6</sup> Furthermore, in our study, the prevalence of acne decreased by age, while that of vitiligo was not different by age group, similarly to the population-based study by Svensson et al., in five European countries (Germany, Italy, The Netherlands, Portugal and Sweden),<sup>6</sup> and in line with the natural course of these diseases.

We found a small effect on quality of life for those with one skin disease as assessed by the DLQI, a validated questionnaire that assesses health-related quality of life over the last week.<sup>7</sup> However, DLQI is

**TABLE 3** Prevalence of participants who reported impact in personal, work and daily life and stigmatization.

Variable	Level of impact	N <sup>a</sup>	Prevalence %	95% ME
<b>Personal life</b>	High impact, disrupting life	57	12.7	3.1
	Moderate impact (I can control it)	140	31.3	4.3
	Mild impact	91	20.3	3.7
	No influence	17	3.8	1.8
	I have no bothering skin problems	143	31.9	4.3
<b>Work life</b>	Adapt working hours	9	16.7	9.9
	Reoriented professional activity	12	22.2	11.1
	Refused a professional offer	7	13.0	9.0
	Did not get the job hoped to	12	22.2	11.1
	Chose my work with skin problem in mind	9	16.7	9.9
	Any of that	24	44.4	13.2
		<b>N<sup>b</sup></b>	<b>%</b>	<b>95% ME</b>
<b>Daily life</b>				
Sleeping difficulty	Very much	14	4.6	2.4
	A lot	32	10.5	3.4
	A little	78	25.7	4.9
	Not at all	180	59.2	5.5
Feel tired	Very much	21	6.9	2.8
	A lot	36	11.8	3.6
	A little	90	29.6	5.1
	Not at all	157	51.6	5.6
Impact on time to take care of her/himself	Very much	13	4.3	2.3
	A lot	49	16.1	4.1
	A little	93	30.6	5.2
	Not at all	149	49.0	5.6
Impact on time to take care of her/his family	Very much	11	3.6	2.1
	A lot	19	6.3	2.7
	A little	47	15.5	4.1
	Not at all	82	27.0	5.0
	Not relevant	145	47.7	5.6
<b>Stigmatization</b>				
Feel left out/rejected by others	Strongly agree	6	2.0	1.6
	Agree	30	9.9	3.4
	Neutral	50	16.4	4.2
	Disagree	99	32.6	5.3
	Strongly disagree	119	39.1	5.5

**TABLE 3** (Continued)

		<i>N</i> <sup>b</sup>	%	95% ME
Access to leisure facilities refused	Strongly agree	6	2.0	1.6
	Agree	14	4.6	2.4
	Neutral	42	13.8	3.9
	Disagree	85	28.0	5.5
	Strongly disagree	157	51.6	5.6
Impression to be looked at with disgust	Strongly agree	8	2.6	1.8
	Agree	22	7.2	2.9
	Neutral	62	20.4	4.5
	Disagree	84	27.6	5.0
	Strongly disagree	128	42.1	5.6

Note: If several skin problems are reported, the answers correspond to the most bothering one.

Abbreviation: ME, 95% margin of error.

<sup>a</sup>At least one skin problem: *N* = 448.

<sup>b</sup>At least one bothering skin problem or unpleasant sensation: *N* = 304.

not designed to capture the impact of skin diseases on important life decisions that have occurred in the past. In our study, skin disease had a considerable impact on long-term decisions; participants reported they re-oriented professional activity, were refused a professional offer, did not get the job they hoped to, or even chose their work with their skin problem in mind. The impact on work life decisions reported in our study highlights the complex burden of skin diseases on important long-term life choices that may affect life's course.<sup>11,12</sup> In addition, in our study, 41% of participants had problems in sleeping and almost half reported tiredness. This could be due to the symptoms, such as itch, and/or to higher levels of stress related to the skin disease.<sup>13,14</sup> Also, half of participants reported an impact of the skin disease on time to care of oneself or one's family. Intense feelings of stigmatization were reported in our study including feeling rejected by others, being denied access to leisure facilities or having the impression to be looked at with disgust. Stigmatization is a multidimensional construct that includes both the experience of the patient and the negative social attitude towards patients' difference,<sup>2</sup> and can be frequent in patients with visible conditions such as psoriasis,<sup>15</sup> rosacea<sup>16</sup> and vitiligo.<sup>17</sup>

Limitations of our study include the survey-based self-reported data and not collecting information on the severity of the skin condition. Strengths of our study include the robust methodology and population-based design.

Knowledge of the prevalence of skin diseases is important as it guides the flow of resources towards

physician and public education, prevention and early diagnosis of the most common skin diseases in each country. Also, the burden and stigmatization related to skin diseases may vary in different cultural settings and with social norms across countries. As shown in our study, skin disease may profoundly affect an individual's personal and work life due to the visibility of the condition and the resistance of others to accept any deviations from a socially described norm. Familiarizing the public with prevalent skin diseases as part of a potential skin appearance may assist to reduce disease-related stereotypes<sup>18</sup> and separate 'normal' from 'healthy'.<sup>19</sup>

In conclusion, our study provides new information on the prevalence of skin diseases in the Southern European country of Greece and highlights the impact of skin disease on personal life and life-altering decisions.

#### AUTHOR CONTRIBUTIONS

Alexander J. Stratigos was involved in conception, acquisition of data, interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Marie A. Richard was involved in conception and design, acquisition of data, analysis and interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Carle Paul was involved in acquisition of data, interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Tamar Nijsten was involved

in conception and design, acquisition of data, analysis and interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Paolo Gisondi was involved in acquisition of data, interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Carmen Salavastru was involved in acquisition of data, interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Charles Taieb was involved in acquisition of data, interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Myrto Trakatelli was involved in acquisition of data, interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Thrasylvoulos Tzellos was involved in acquisition of data, interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Clio Dessinioti was involved in acquisition of data, interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published. Dimitrios Ioannides was involved in acquisition of data, interpretation of data, draughting the article and revising it critically for important intellectual content, final approval of the version to be published.

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## DATA AVAILABILITY STATEMENT

Data can be provided for valid scientific non-commercial purposes.

## ETHICS STATEMENT

Data collections were done in respect of ethical codes of the European society for Opinion and Marketing Research (ESOMAR) in compliance with the GDPR rules.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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