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Target the message: A qualitative study exploring knowledge and cultural attitudes to sunlight and vitamin D in Greater Manchester, UK.

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Table count: 2

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Conflicts of interest: None declared
Vitamin D is vital for musculoskeletal health and has been associated with protection against several internal cancers and auto-immune diseases.\textsuperscript{1,2} Skin synthesis following exposure to ultraviolet radiation (UVR) in sunlight is the major source of the vitamin, with diet providing only small amounts.\textsuperscript{3} Skin synthesis requires sunlight exposure containing sufficient UVB to initiate vitamin D synthesis, which precludes the winter months at mid-high latitudes, including the UK.\textsuperscript{3,4} Without continuous supplementation, maintaining vitamin D sufficiency, defined as circulating 25-hydroxyvitamin D (25OHD) $\geq 50$ nmol/L (20 ng/ml),\textsuperscript{2} is most efficiently achieved through casual sunlight exposure to unprotected skin. This contrasts with public health messages from the past 20 years advocating sun protection to reduce skin cancer risk, and to some cultural practices, exacerbated in those with naturally pigmented skin as melanin absorbs a proportion of the UVR.\textsuperscript{5,6}

Studies in Greater Manchester, UK (53.5°N)\textsuperscript{5,7-9} involving white Caucasian and South Asian adults, showed sunlight exposure to be the primary means of acquiring vitamin D with diet a low source. A seasonal 25OHD cycle was observed in both groups, with lower amplitude in South Asian adults, of whom 93% had levels <50 nmol/L throughout the year.\textsuperscript{9} Vitamin D guidance states “most people should be able to make enough from short, casual exposure like you might get just by going about your daily life”.\textsuperscript{10} Thus we undertook a qualitative focus group study involving healthy white Caucasian and South Asian volunteers to explore knowledge and attitudes towards vitamin D and sunlight exposure/protection behaviour. This methodology can effectively explore views and beliefs to understand/explain factors influencing individuals’ attitudes and behaviours.\textsuperscript{11} Casual exposure was quantified as $\sim$15 minutes to face, arms and legs, most days of the week during summer for white Caucasians,\textsuperscript{7} and 30-40 minutes for South Asians.\textsuperscript{6} The University of Manchester Research Ethics Committee granted ethical approval (Ref. 14133). Study
documentation was made available in English and Urdu and all volunteers provided written informed consent.

Three focus groups were held from May–July 2014, defined by ethnicity and primary language (Table 1), conducted by a multilingual researcher experienced in focus group facilitation and supported by an English-speaking vitamin D expert. All volunteers were recruited from the Longsight area of Greater Manchester, avoiding confounding by socioeconomic status. A brief introduction was followed by open-ended questions, including general questions about sunlight and vitamin D and more specific queries about personal sun exposure. There was ample interaction between group members and discussion was encouraged to continue until no new information was forthcoming. Audio recordings were translated where required, and transcribed into Microsoft Word. Transcripts were coded using MAXQDA11 (qualitative data analysis software) then exported to matrices for analysis by systematic text condensation.

For South Asian adults in Longsight, living in a strongly traditional community, primary language did not seem to indicate degree of cultural assimilation, although no volunteers had fully-adopted a western lifestyle (indicated by dress, language and cultural references). All but one of the South Asian volunteers were female who usually control the family diet and may influence health behaviour of family members. Most were restricted in dress by cultural traditions with results reflecting the cultural contrast between this group and white Caucasian participants (Table 2).

Level of awareness of vitamin D and its relationship to sunlight exposure was similar in the two South Asian groups but contrasted with that of white Caucasians. South Asians were much more knowledgeable, with the majority aware that vitamin D was important for bone health and could be obtained from sunlight exposure. White Caucasians had a substantial
lack of knowledge with most unaware of vitamin D sources or its association with sunlight exposure. The greater knowledge of South Asians appeared to be primarily due to experience with symptoms of poor bone health, either directly or through a family member/community acquaintance, resulting in a GP visit and vitamin D blood test. Despite this greater knowledge, use of vitamin D supplements by the wider South Asian population in Greater Manchester is extremely low and levels of sunlight exposure less than those of white Caucasian adults in the same location. However, for South Asian participants taking supplements, this was their preferred method of vitamin D acquisition, while white Caucasians were generally averse to regular supplement taking. Thus, for South Asians, communication of advice may be inadequate rather than there being an unwillingness to take supplements.

National guidance to practise brief sunlight exposure for vitamin D acquisition was well received by white Caucasians, but was associated more with enjoyment of spending time outdoors in sunlight than with vitamin D. In contrast, some South Asians practised sunlight exposure specifically for vitamin D acquisition. There was, however, misunderstanding regarding the need for direct sunlight exposure to unprotected skin, with several participants incorrectly believing that exposure indoors through window glass was sufficient. Thus more explicit guidance is indicated; in addition to advice on amounts of sunlight exposure there needs to be education about how vitamin D is acquired. White Caucasian participants were confused by mixed messages regarding sunlight exposure (risk/benefit) and frequently used sunscreen as they correctly associated sunburn and excessive sunlight exposure with risk of skin cancer. Furthermore, poor knowledge of dietary vitamin D sources meant many participants regarded a ‘balanced diet’ as being adequate.
Few qualitative studies have explored sunlight exposure and vitamin D in healthy adults. Studies from Australia and the UK report lack of vitamin D knowledge and confusion surrounding contradictory sunlight exposure messages.\textsuperscript{12-14} Clearly risk/benefit and nutritional messages require better communication\textsuperscript{15}. Our three focus groups felt that better information provided in a variety of formats would help raise awareness and let individuals make appropriate choices of their preferred source of vitamin D. Public health messages and education campaigns should include culturally appropriate advice to better target the needs of different population sectors.

**Acknowledgements**

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References


7. Rhodes LE, Webb AR, Fraser HI et al. Recommended summer sunlight exposure levels can produce sufficient (≥20 ng ml⁻¹) but not the proposed optimal (≥32 ng ml⁻¹) 25(OH)D levels at UK latitudes. *J Invest Dermatol* 2010; 130:1411–8.


### Table 1 Details of Focus Groups and volunteers

<table>
<thead>
<tr>
<th></th>
<th>Group A (n=10)</th>
<th>Group B (n=10)</th>
<th>Group C (n=6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnicity</strong></td>
<td>South Asian</td>
<td>South Asian</td>
<td>White Caucasian</td>
</tr>
<tr>
<td></td>
<td>(Pakistani)</td>
<td>(Pakistani)</td>
<td>(white British)</td>
</tr>
<tr>
<td><strong>Primary language</strong></td>
<td>Urdu or Punjabi</td>
<td>English</td>
<td>English</td>
</tr>
<tr>
<td><strong>No. male / female</strong></td>
<td>0 / 10</td>
<td>1 / 9</td>
<td>2 / 4</td>
</tr>
<tr>
<td><strong>Age range (years)</strong></td>
<td>24 – 65</td>
<td>21 – 55</td>
<td>24 – 60</td>
</tr>
<tr>
<td><strong>Focus group duration (hours)</strong></td>
<td>1</td>
<td>1.5</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2 Illustrative responses from Focus Group participants on the main topics of discussion.

<table>
<thead>
<tr>
<th>Topic</th>
<th>South Asian (Grp A &amp; B)</th>
<th>White Caucasian (Grp C)</th>
<th>Comments/quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aware that sunlight is a source of vitamin D</td>
<td>Common knowledge</td>
<td>Not well known</td>
<td>“I did not know anything about vitamin D till I had these aches and pains and had my blood tests done. After that yes I know that vitamin D makes your bones strong. And it can be taken by sitting in the sunlight.” Group A</td>
</tr>
<tr>
<td>Aware of how much sun exposure is required</td>
<td>No</td>
<td>No</td>
<td>One S Asian lady was advised 40 min per day. Another mentioned 15 min per day. Otherwise, they considered shopping and collecting children as sun exposure activities. White Caucasians had more extensive time in sun.</td>
</tr>
<tr>
<td>Sun exposure advised by physician</td>
<td>Yes</td>
<td>No</td>
<td>“My GP told me to sit in the sun, so I do it.” Group A</td>
</tr>
<tr>
<td>Understand need to expose unprotected skin</td>
<td>Some confusion</td>
<td>n/a</td>
<td>“I don't have a private garden; it is overlooked, so whenever I get time I usually sit in my conservatory near the window to get sunlight.” Group A</td>
</tr>
<tr>
<td>Understand risks of sun exposure</td>
<td>No</td>
<td>Yes</td>
<td>“Some of things that you’re told not to do.... you’re not supposed to go out in the sunshine unless you’ve got sunscreen.” Group C</td>
</tr>
<tr>
<td>Behaviour</td>
<td>Yes but limited areas</td>
<td>Yes</td>
<td>“I also like sitting out in the sun at home, usually for 15 or 20 minutes</td>
</tr>
</tbody>
</table>
Wear sunscreen frequently  
<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

“I’ve probably got some kind of skin cream on most of the time with some kind of protection in….mostly I use sunscreen as well, so I think a lot of women would be the same, especially women over 35.” Group B

Expose more than hands/face/neck  
| Yes | Limited (females) | Yes | (both sexes) |

“I think the clothing styles of men in our Asian culture are different as compared to females…we usually wear T-shirts and shorts in summer. There won’t be any issues with the male members as they are allowed to wear all sorts of clothing but there will be limits for females.” Male, Group B

“My daughters are aware of it and they usually sit outside in the back garden turning up their trousers till knees and sometimes they wear sleeveless shirts so that they could expose their skin to sunlight. This happens when the male members of the family are not there and are at work and all the females are at home. We have cultural and religious obligations and cannot allow them to cross those limits.” Group A

Been prescribed supplements  
| Yes | No |

Several South Asian participants were happy to take a prescription supplement.

Take supplements (if not prescribed)  
| No | No |

National guidance is 10 μg vitamin D/day orally for South Asians, but no pro-active effort to follow his advice

Preference for supplements as vitamin D source  
| Yes | No |

“I would love to take supplement tablets as it’s the easiest way.” Group A

“No, no…. not any more tablets as I
<table>
<thead>
<tr>
<th>Focus Group suggestions for increasing awareness</th>
<th>GPs to better advise patients on vitamin D sources including casual sunlight exposure.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Posters in recreational facilities, community centres, places of worship.</td>
</tr>
<tr>
<td></td>
<td>Specific targeting of South Asian women regarding greater skin exposure.</td>
</tr>
<tr>
<td></td>
<td>Discussion groups/workshops for general public, schools.</td>
</tr>
</tbody>
</table>