

# BMJ Open Understanding patient preference for physician attire in ambulatory clinics: a cross-sectional observational study

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## ABSTRACT

**Objectives** We explored patient perceptions regarding physician attire in different clinical contexts and resultant effects on the physician–patient relationship.

**Setting** The 900-bed University Hospital Zurich, Switzerland.

**Participants** A convenience sample of patients receiving care in dermatology, infectious diseases and neurology ambulatory clinics of the University Hospital Zurich participated in a paper-based survey.

**Primary and secondary outcome measures** The survey instrument was randomised and showed photographs of male or female physicians wearing various forms of attire. On the basis of the respondents' ratings of how the physician's attire affected perceptions across five domains (knowledgeable, trustworthy, caring, approachable and comfort with the physician), a composite preference score for attire was calculated as the primary outcome. Secondary outcomes included variation in preferences by respondent characteristics and context in which care was provided.

**Results** Of 834 patient respondents (140 in dermatology, 422 in infectious diseases and 272 in neurology), 298 (36%) agreed that physician attire was important. When compared with all available choices, the combination of white scrubs with white coat was rated highest while a business suit ranked lowest. Variation in preferences and opinions for attire were noted relative to respondent demographics and the clinical setting in which the survey was administered. For example, compared with younger patients, respondents  $\geq 65$  years of age more often reported that physician dress was both important to them and influenced how happy they were with their care ( $p=0.047$  and  $p=0.001$ , respectively).

**Conclusions** Outpatients at a large Swiss University hospital prefer their physicians to be dressed in white scrubs with white coat. Substantial variation among respondents based on demographics, type of physician and clinical setting were observed. Healthcare systems should consider context of care when defining policies related to dress code.

## INTRODUCTION

The relationship between patients and physicians is a key to high-quality healthcare.<sup>1</sup> Multiple studies have shown an association

## Strengths and limitations of this study

- Novel findings of physician attire preference and impact with patients in Swiss context.
- Large respondent population across three different ambulatory settings.
- Survey instrument minimised bias via professional design and randomisation of attire photographs.
- Reasons for patients' perceptions of and preferences for attire were not investigated.
- Study included patients from a single hospital but multiple clinics.

between patient satisfaction with their care and health outcomes, including adherence to medication regimens, screening tests, 30-day readmission and mortality.<sup>2–8</sup>

One novel approach to improving the patient experience is through tailoring physician attire to match patient expectations for a given clinical care setting. A recent systematic review of 30 studies found that patients generally preferred the combination of white coat and formal attire, while scrubs were preferred in acute care or procedural settings.<sup>9</sup> In addition to clinical context, patient factors, such as age, also influence perception of physician attire. For example, in a study of paediatric patients, children rated physicians dressed in formal attire with a white coat as competent but not friendly,<sup>10</sup> whereas patients  $\geq 40$  years of age rated preference for formal attire.<sup>9</sup> Despite growing scholarship in this field, knowledge regarding the nuances of what variables drive patient preferences for physician attire and how these may correlate to level of satisfaction remains limited. This is particularly true for certain parts of the world, including Switzerland, where few data regarding patient preference for physician attire exist.

Therefore, we performed a cross-sectional survey of patients in three specialised

ambulatory clinics at a large Swiss University hospital. Our goal was to examine patients' preferences for various forms of physician attire across various clinical settings. We hypothesised that patients would prefer white uniforms (as are commonly worn by Swiss physicians) in most clinical settings.

## METHODS

### Study design and population

Between 15 June 2015 and 31 October 2016, we conducted a survey targeting a convenience sample of adult patients in dermatology, infectious diseases and neurology ambulatory clinics at the University Hospital Zurich, Switzerland. Patients were presented with a paper-based instrument of 22 questions that included photographs of male and female physicians wearing various forms of attire and asked to rate preferences. The survey was administered by research staff and no identifying information was collected.

### Survey design and implementation

Survey questions were developed following a systematic review of the literature that examined the role of physician attire on the patient experience.<sup>9</sup> The findings from the systematic review were discussed among the study team, and questions were written in German. The study design and methods followed those previously described.<sup>11</sup> Before administration, the survey instrument was piloted by a multidisciplinary team to gather feedback and refine photographs, questions, rating scale, presentation order and randomisation scheme.

Each question in the survey referenced particular preferences and opinions of respondents in relation to photographs of medical providers wearing various forms of attire. The forms presented included: casual, casual with a white coat, white scrubs, white scrubs with a white coat, formal, formal with a white coat and business suit. Photographs of providers in medical attire contextually appropriate to the Swiss health system were taken by a professional photographer, ensuring that facial expressions and all other visual cues (eg, lighting, background and pose) were kept constant (online appendix figure 1 and 2).

To avoid biases, such as anchoring, order response and gender conformity, 14 different versions of the survey instrument were created. Each instrument had four sections (online appendix figure 1 and 2). The gender and attire of the first photograph seen by each respondent were randomised to prevent ordering, priming and anchoring bias; all other sections of the survey were identical.

### Measurements

Respondents were first asked to rate the single, randomised photograph of a physician using a 1–10 scale across five domains (how knowledgeable, trustworthy, caring and approachable the physician appeared

and how comfortable the physician's appearance made the respondent feel), with 10 being the highest rating ('extremely'). Next, respondents were presented with seven photographs of the same physician wearing various attire. Questions regarding preference of attire in certain clinical settings (ie, primary care, emergency room (ER), hospital, surgery and overall preference) were posed. To elicit respondent preferences regarding the relative influence of physician dress and white coats on preferences, a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used and trichotomised into 'disagree' (1 and 2), 'neither agree nor disagree' (3) and 'agree' (4 and 5) for the analysis. Demographic data including age, gender, education level, origin (European or non-European) and number of physician encounters in the past year was collected; questions with more than one response were reported as missing.

### Outcome measures

The primary outcome of interest was preference for physician attire, measured by the composite average rating score for the initial photograph. The rating score was calculated as the average of all responses across the five individual rating domains (knowledgeable, trustworthy, caring, approachable and comfortable). Composite rating scores were only calculated for respondents who left no unanswered rating questions on the instrument. Secondary outcomes included respondent preference for physician attire (specifically for white coat vs no coat, white scrubs vs attire other than scrubs and formal vs informal attire) as well as variation by demographic and clinical context.

### Statistical analyses

Data from paper surveys were entered independently and in duplicate by two members of the research team. Respondents were not required to answer all questions, and therefore response rates for individual questions varied.

We targeted an overall population size of 1000 participants as we assumed that responses between two attire forms would be normally distributed on the 1–10 scale between attire types. An estimated SD of 2.2 was used. If our study included at least 816 patients (assuming a two-sided alpha error of 0.05), we expected to have 90% power to detect differences for effect sizes of 0.50 on the 1–10 scale.

Descriptive statistics were used to tabulate results and were expressed as means with SD and percentages. Questions that were unanswered or where more than one response was entered were excluded. Differences in the mean composite rating score between the initial photograph and other photographs were assessed using one-way analysis of variance. Postestimation pairwise comparisons were performed using the Tukey-Kramer test.<sup>12</sup> Proportions were tabulated for categories from section 2 and were compared using the Z-test for proportions. Bivariable comparisons between respondent demographics,

mean ratings and preferences for categories of attire were assessed using T-squared and  $X^2$  tests, respectively. Differences in opinions and preferences by respondent demographics were assessed using  $X^2$  and Fisher's exact tests, as appropriate. A two-sided p value of less than 0.05 was considered statistically significant. All analyses were performed in Stata V.14 MP/SE.

### Patient and public involvement

Patients were not included in the design of the survey instrument, recruitment or conduct of the study. Patients who participated did so anonymously, and therefore, the study team will be unable to disseminate the results to study participants.

## RESULTS

A total of 834 patients including those from dermatology (140; 17%), infectious diseases (422; 51%) and neurology clinic (272; 33%) completed the survey. The majority of respondents were men (62%). Almost half of the respondents had higher education (44%) and were between 35 and 54 years of age (42%). Approximately, two-thirds of those surveyed had experienced three or more physician visits in the past year (table 1).

### Ratings of physician attire

Compared with all other forms, respondents rated white scrubs with white coat as the most preferred form of attire, with a mean composite score of 7.5 (SD 1.7) (figure 1). Cronbach's alpha for the five items included in the composite score was 0.95. The combination of white scrubs with white coat was rated highest overall for photographs of both male and female physicians. For all photographs, white scrubs with white coat was rated highest for the individual domains of how trustworthy, caring and approachable the physician appeared as well as how comfortable the physician made the respondent feel. Additionally, formal attire with white coat was rated highest for how knowledgeable a physician appeared. For the composite measure, formal attire without white coat and formal business suit received low ratings relative to other forms of attire, for both genders of physician models.

### Preferences for physician attire by clinical context

Preferences for physician attire varied by medical setting (table 2). Respondents had a mix of preferences for primary care physician dress, with nearly equal preference for casual attire, formal attire with white coat and casual attire with white coat. White scrubs, with or without a white coat, were the preferred dress for ER, hospital-based and surgery physicians. When asked, 'Overall, which clothes do you feel your doctor should wear?' the majority of respondents indicated white scrubs with or without a white coat. With regard to the use of white coats, patients preferred their physician to wear a white coat, particularly in primary care and hospital settings. In

**Table 1** Respondent demographics and healthcare utilisation, n=834

Characteristics, n (%)	Overall
Age (years)	n=812
18–25	50 (6)
26–34	93 (12)
35–54	341 (42)
55–64	192 (24)
65+	136 (17)
Gender	n=806
Female	304 (38)
Male	502 (62)
Education	n=808
Primary or less	39 (5)
Apprenticeship	329 (41)
Secondary school certificate	82 (10)
University of applied sciences	198 (24)
University	142 (18)
Graduate degree or above	18 (2)
Continent of origin	n=575
Non-European	48 (8)
European	527 (92)
Number of physicians seen in the past year	n=810
0	13 (2)
1	83 (10)
2	165 (20)
3	203 (25)
4	126 (16)
5	57 (7.0)
6 or more	163 (20)

all clinical settings, patients clearly preferred formal attire with white coat, compared with formal attire alone. With regard to the use of scrubs, patients preferred any attire that included white scrubs compared with attire that did not, a finding that held true for ER-based, hospital-based and surgery-based physicians. In contrast, patients strongly preferred primary care physicians not wear scrub-based attire. When comparing casual to formal attire, patients preferred casual dress (with or without white coat) for primary care, ER and hospital-based physicians, but formal dress (with or without white coat, including suit) for their surgeons and overall.

### Perceived importance and appropriateness of physician attire

Over a third of respondents agreed with the statement that the way their physician dressed was important to them, whereas about a fourth of respondents agreed with the statement that physician attire influenced how happy they were with the care they received (table 3). Over half of respondents felt that it was appropriate for physicians



\*Significantly different when compared to the referent group (scrubs + white coat) at  $p < 0.05$

**Figure 1** Preferences of attire type, overall, and by perceived physician qualities. The columns show the overall average composite rating score and 95% CIs for the seven female and male attire types (pictures) from left to right: casual attire, casual attire with white coat, white scrubs, white scrubs with white coat, formal attire, formal attire with white coat and suit. The individual results per perceived physician quality and attire type appear in the table below. REF, referent.

to dress casually when seeing patients over the weekend. Exactly half of the respondents agreed with the statement that physicians should wear a white coat when seeing patients in the office, and almost 80% agreed with this statement for physicians in the ER or hospital. A third of respondents agreed with the following statement: 'Doctors should always wear a white coat when seeing patients in any setting'.

#### Variations in opinions and preferences of physician attire across different patient groups

Preferences for physician attire in different clinical settings varied by respondent age (table 4). For primary care physicians, respondents of all ages preferred both casual dress and formal attire with white coat, but respondents <65 years of age more often preferred casual dress with white coat compared with those  $\geq 65$  years of age ( $p=0.008$ ). In the ER, respondents <65 years of age more often preferred scrubs compared with respondents 65 years and older (48% vs 43%,  $p=0.049$ ). Respondents  $\geq 65$  years of age placed higher importance on physician attire (46% vs 34%,  $p=0.047$ ) and reported greater influence on happiness with care received by physicians' attire (34% vs 21%,  $p=0.001$ ) compared with those <65 years of age. Older respondents more often agreed that it is appropriate for a physician to dress casually when seeing patients over the weekend (61% vs 50%,  $p=0.027$ ) and that physicians should wear a white coat when seeing patients in any setting (45% vs 31%,  $p=0.006$ ).

While opinions regarding appropriateness of physician dress did not significantly differ by respondent gender, one exception was appropriateness of casual dress when seeing patients over the weekend. In this question, male respondents more often agreed that casual dress was

appropriate on the weekend than female respondents. Respondents visiting the neurology or dermatology clinic more often agreed that physician dress was important to them when compared with respondents in the infectious diseases clinic (41% and 41% vs 32%,  $p=0.038$ ).

#### DISCUSSION

To the best of our knowledge, this study of over 800 patients across three ambulatory specialty clinics in a university hospital in Switzerland is the largest account of physician attire preferences in Europe. Our study provides valuable insights into patients' perceptions of the impact of wearing and not wearing a white coat—a research question of the areas for future research in the Society for Healthcare Epidemiology of America (SHEA) expert guidance.<sup>13</sup> More than one-third of respondents placed importance on physician clothing and one-fourth stated that it influenced their satisfaction with the care provided. Overall, this patient population identified white scrubs with white coat as the most preferred form of dress, yet differences among respondents based on age and gender, type of physician, timing of care and clinical setting were observed. For example, white scrubs were preferred for ER, hospital-based and surgeon physicians, yet there was a strong disinclination toward the use of scrubs for primary care physicians. There was a clear preference identified for formal attire with white coat compared with formal attire alone. Preferences and importance for types of attire also varied, with older patients indicating more preference for white coats, higher importance of physician attire, and higher influence on happiness with care received attributable to physician attire. These findings

**Table 2** Respondent preferences for physician attire in various settings, n=834

Preference for physician attire by setting	Overall N (%)
Which doctor would you prefer for your primary care physician?	n=817
Casual attire	199 (24)
Formal attire with white coat	188 (23)
Casual attire with white coat	183 (22)
White scrubs	90 (11)
White scrubs with white coat	78 (10)
Formal attire	73 (9)
Suit	6 (1)
Which doctor would you prefer to see when visiting the emergency department?	n=814
White scrubs	382 (47)
White scrubs with white coat	271 (33)
Casual attire with white coat	65 (8)
Formal attire with white coat	52 (6)
Casual attire	31 (4)
Formal attire	8 (1)
Suit	5 (1)
Which doctor would you prefer when in the hospital?	n=813
White scrubs with white coat	285 (35)
White scrubs	203 (25)
Casual attire with white coat	138 (17)
Formal attire with white coat	129 (16)
Casual attire	33 (4)
Formal attire	20 (2)
Suit	5 (1)
Which doctor would you prefer for your surgeon?	n=810
White scrubs	345 (43)
White scrubs with white coat	272 (34)
Formal attire with white coat	108 (13)
Casual attire with white coat	44 (5)
Casual attire	17 (2)
Formal attire	17 (2)
Suit	7 (1)
Overall, which clothes do you feel your doctor should wear?	n=800
White scrubs with white coat	252 (32)
White scrubs	205 (26)
Casual attire with white coat	136 (17)
Formal attire with white coat	131 (16)
Casual attire	46 (6)
Formal attire	22 (3)
Suit	8 (1)

reinforce the previously described belief that a ‘one-size-fits-all’ approach to physician dress code is not possible.<sup>9,11</sup> Rather, tailored approaches to physician attire based on clinical and patient factors appears appropriate.

**Table 3** Respondent opinions regarding influence, importance and appropriateness of physician dress, n=834

Opinions regarding influence and appropriateness of physician dress	Total N (%)
How my doctor dresses is important to me.	n=819
Agree	298 (36)
Neither agree nor disagree	260 (32)
Disagree	261 (32)
How my doctor dresses influences how happy I am with the care I receive.	n=817
Agree	188 (23)
Neither agree nor disagree	171 (21)
Disagree	458 (56)
It is appropriate for a doctor to dress casually when seeing patients over the weekend.	n=809
Agree	419 (52)
Neither agree nor disagree	147 (18)
Disagree	243 (30)
Doctors should wear a white coat when seeing patients in their office.	n=818
Agree	408 (50)
Neither agree nor disagree	170 (21)
Disagree	240 (29)
Doctors should wear a white coat when seeing patient in the emergency department.	n=815
Agree	637 (78)
Neither agree nor disagree	75 (9)
Disagree	103 (13)
Doctors should wear a white coat when seeing patients in the hospital.	n=815
Agree	592 (73)
Neither agree nor disagree	128 (16)
Disagree	95 (12)
Doctors should always wear a white coat when seeing patients in any setting.	n=818
Agree	273 (33)
Neither agree nor disagree	202 (25)
Disagree	343 (42)

Because relationships form the cornerstone of effective communication and trusting alliances, establishing a positive first impression is paramount. Cognitive psychology literature suggests that such impressions are formed within the initial 39 milliseconds on contact with another individual.<sup>14</sup> Physician attire may, thus, be an important component in establishing a positive physician–patient relationship.

Several potential explanations exist for our data. First, sociocultural context and norms must always be considered when addressing issues of physical appearance in any group of individuals. Many individuals develop

**Table 4** Opinion regarding importance and appropriateness of physician attire in different settings by gender and age, n=834

Opinions regarding influence and appropriateness of physician dress	Gender; N (%)		P value	Age (years); N (%)		P value
	Male	Female		<65	≥65	
How my doctor dresses is important to me.	n=498	n=302	0.128	n=672	n=134	0.047
Strongly disagree/disagree	172 (34)	85 (28)		222 (33)	35 (26)	
Neither agree nor disagree	158 (32)	98 (32)		219 (33)	38 (28)	
Agree/strongly agree	168 (34)	119 (39)		231 (34)	61 (46)	
How my doctor dresses influence how happy I am with the care I receive.	n=497	n=302	0.638	n=671	n=133	0.001
Strongly disagree/disagree	282 (57)	169 (56)		395 (59)	58 (44)	
Neither agree nor disagree	99 (20)	68 (22)		137 (20)	30 (22)	
Agree/strongly agree	116 (23)	65 (22)		139 (21)	45 (34)	
It is appropriate for a doctor to dress casually when seeing patients over the weekend.	n=492	n=299	0.008	n=663	n=134	0.027
Strongly disagree/disagree	130 (26)	109 (36)		212 (32)	28 (21)	
Neither agree nor disagree	87 (18)	52 (18)		119 (18)	24 (18)	
Agree/strongly agree	275 (56)	138 (46)		332 (50)	82 (61)	
Doctors should wear a white coat when seeing patients in their office.	n=497	n=302	0.368	n=671	n=134	0.559
Strongly disagree/disagree	146 (29)	89 (30)		200 (30)	37 (28)	
Neither agree nor disagree	112 (23)	56 (18)		144 (22)	25 (19)	
Agree/strongly agree	239 (48)	157 (52)		327 (48)	72 (54)	
Doctors should wear a white coat when seeing patients in the emergency department.	n=496	n=300	0.073	n=668	n=134	0.370
Strongly disagree/disagree	72 (14)	27 (9)		89 (13)	12 (9)	
Neither agree nor disagree	45 (9)	28 (9)		61 (9)	12 (9)	
Agree/strongly agree	379 (76)	245 (82)		518 (78)	110 (82)	
Doctors should wear a white coat when seeing patients in the hospital.	n=497	n=300	0.145	n=670	n=133	0.284
Strongly disagree/disagree	63 (13)	30 (10)		81 (12)	12 (9)	
Neither agree nor disagree	83 (17)	39 (13)		110 (16)	17 (13)	
Agree/strongly agree	351 (71)	231 (77)		479 (72)	104 (78)	
Doctors should always wear a white coat when seeing patients in any setting.	n=497	n=303	0.085	n=672	n=134	0.006
Strongly disagree/disagree	211 (42)	127 (42)		294 (44)	46 (34)	
Neither agree nor disagree	134 (27)	64 (21)		172 (26)	28 (21)	
Agree/strongly agree	152 (31)	112 (37)		206 (31)	60 (45)	

expectations of how physicians appear through illustrated books, and popular media, such as news, television and movies.<sup>15 16</sup> Second, expectations and sociocultural norms for appearance differ by geographic regions, a finding emphasised in the review by Petrilli *et al* in which patients in European and Asian countries more often preferred formal attire compared with patients in the USA.<sup>9</sup> Finally, for institutions and health systems with formal dress code policy, expectations are clearly defined such that patients become accustomed to these norms. Notably, Switzerland's defined uniform is white scrubs with white coat, the overall preferred form of physician attire identified in our study. The predilection for white coats, as evidenced by preference for formal attire with white coat compared

with formal attire alone, may indicate value placed on the white coat as a symbol of the profession.

Our findings corroborate previously described conscious and unconscious preferences patients harbour for clinician appearance. In a systematic review, 21 out of 30 examined studies showed a preference or positive influence from physician attire; in 18 of these 30 studies, formal attire with white coat was preferred compared with other forms of attire.<sup>9</sup> Similarly, in a recent multi-centre study in the USA, formal attire with a white coat was preferred by patients across 10 academic medical centres.<sup>11</sup> Shelton *et al* noted that physicians are better identified by their white coat or formal attire, lending credence to the concept of a professional uniform

for rapid and easy recognition of role.<sup>17</sup> In their study, Menahem and Shvartzman noted that a majority of patients preferred physicians with white coats and that older patient age was associated with preference for white coat.<sup>18</sup> Cha *et al* identified a positive correlation between scrubs with white coat and patient perceptions of physician competence as well as patient level of comfort.<sup>19</sup> Rehman *et al* similarly found that trust and confidence were significantly associated with professional attire.<sup>20</sup> Our study adds to the field by relating preferences to specific patient groups and care settings and providing European context to these data.

As an example of authoritative guidance on medical provider attire in clinical, non-surgical areas, the SHEA recently issued a guideline based on literature reviews and surveys on institutional policies and provider perceptions.<sup>13</sup> The guideline concludes that due to the paucity of data the optimal choice of HCP attire for inpatient care remains undefined and calls for well-designed studies to better define the relationship between provider attire and healthcare-associated infections.

This study has several limitations. First, as with other studies of physician attire, the survey instrument consisted of photographs of either a single male or female physician when deciding on their preferences for physician attire, which may not reflect real-world preferences. Second, a response bias may have been introduced, as it was impossible to calculate the exact response rate in this busy outpatient setting. Third, a structured Likert scale with predefined categories may have been too rigid to capture subtle variation in human perception, even though we used a broad 1–10 scale for preference when appropriate. Fourth, we could not elicit why patients harboured the preferences they held. Future work may wish to engage patients to understand drivers behind such expectations, perhaps better-informing physician dress policy. Fifth, although inclusive of different clinics and patient populations, our study was performed in one hospital in a region of Switzerland with specific sociocultural ideals; this may limit generalizability of our findings to other settings. Furthermore, we did not collect data on the number of individuals lost due to not being able to read German. In our experience, however, this represents a very small proportion of the Zurich population. Sixth, traditionally, HCP scrubs are of white colour in our hospital—with the exception of scrubs worn in the operating room and other confined settings. Hence, our survey cannot answer the question whether another colour of the scrubs would have affected the results. Finally, attire might also influence the self-perception of physicians and alter their feelings of authority, trustworthiness and competence, and by this route influence the quality of medical care.<sup>21–23</sup> We did not explore this dimension of physician attire in this study.

Our study also has notable strengths. First, it included a large population across three different ambulatory care settings and features strong methodological features including randomisation of instrument sequence.

Second, unlike other studies, we avoided biases associated with images by using a professional photographer and ensuring that background, angle, lighting and human expression were indistinct between different photographs.<sup>13 24–30</sup> These study elements promote a high degree of internal validity to our findings. Third, by better understanding patient preferences for a variety of types of physician attire in various contexts and comparing patients with different demographics, we are well suited to inform policies that optimise patient satisfaction. Fourth, our findings lend themselves to informing dress code policies for physicians in our clinical departments, which may help to improve consistency of dress and ultimately patient satisfaction.

In summary, physician attire is important to patients and influences their satisfaction with care. Creation of context-specific dress code policy by hospitals and health systems may lead to an improved physician–patient relationship, satisfaction and adherence, potentially improving clinical outcomes for patients. Future research efforts centred on better understanding sociocultural norms that inform patient expectations of physician attire appear necessary.

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**Contributors** 1a, conception; 1b, data acquisition; 1c, data analysis; 1d, data interpretation; 2a, manuscript drafting; 2b, manuscript revision; 3, final manuscript approval; and 4, being accountable for all aspects of the work. MZ: 1b, 1c, 1d, 2b, 3 and 4; NH: 1d, 2a, 2b and 3; VC, SS and CMP: 1a, 1b, 1c, 1d, 2a, 2b, 3 and 4; LC: 1d, 2b, 3 and 4; PWS: 1b, 1d, 2b, 3 and 4; LK: 1b, 1c, 1d, 2b and 3; AS: 1c, 1d, 2b and 3; and HS: 1b, 1c, 1d, 2a, 2b, 3 and 4.

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