



Examiners' Report Lead Examiner Feedback

January 2021

Pearson BTEC Nationals
In Applied Human Biology (21327L)
Unit 3: Human Biology and Health Issues

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Introduction

This was the second sitting of unit 3.

Although learners will not be aware of the topic of the article prior to the examination, they will be able to develop the skills required to provide well developed and structured responses to the tasks and draw their knowledge and understanding from the unit into their responses.

Introduction to the Overall Performance of the Unit

Areas where candidates performed well were:

Question 1 – discussing the reliability of sources and references in the article.

Question 2 – discussing implications from the scientific issues.

Question 3 – identifying different organisations or individuals from the article.

Question 4 – selecting an appropriate format and tone for the target audience.

Question 5 – discussing the concerns surrounding pre-employment genetic screening.

Areas where candidates could do better were:

Question 1 – identifying and explaining evidence from the article to discuss the validity of the judgements being made.

Question 2 – linking different impact areas.

Question 3 – explaining the sphere of influence of the identified organisations or individuals.

Question 4 – expanding upon the areas of further research or development that were identified from the articles.

Individual Questions

Question 1

Discuss how the article uses scientific information to present the pre-employment genetic screening issue.

(12 marks)

Learners seemed to be able to discuss the evidence in the article but seemed to struggle with the concept of the article being valid and reliable. Some learners did not demonstrate that they understood the meaning of validity within a scientific context. Those that did often started by stating what validity and reliability meant. Most who answered the question well mentioned the number of references, if the references were likely to be peer reviewed, the date of the references and possible reputation of the authors of the references and figures. Higher scoring learners recognised that a synopsis of many studies showing agreement could assess reliability. Some learners tried to give a balanced discussion by critiquing the article and highlighting the key points that indicate that the article is valid and areas which could suggest that the article was not fully reliable. The learners who gained marks in bands 3 or 4 for their response considered the support for the ideas in the article, any contradictions or errors, number and quality of the references, the expertise of the named individuals and organisations, any bias within the article and the sample size and detail in the data. Learners could have developed their interpretation and analysis by working methodically through the article and making reference to the key areas, including the figures. Some learners misunderstood the focus of the question and discussed how article could have been improved.

The response below shows understanding of scientific articles and references and has commented on the positive and negative aspects of the article. The presentation of the issues surrounding pre-employment genetic screening is discussed, consistently supported throughout by the consideration of how the article has interpreted and analysed the scientific information to support the conclusions/judgements being made. This response was placed in the middle of band 4 and awarded 11 marks. The response displays a well- developed and logical discussion that clearly considers a wide range of different aspects, however, the learner has not been awarded the full 12 marks for this response as some of the lines of argument were not fully developed. The learner could have included more detail about the validity of the judgments being made as the response discusses reliability in detail. For example, the learner could have included comments about possible bias of the article or the references, or made comment that peer review is not always infallible, or more discussion on the analysis of the figures, especially including reference to figure 1.

The article recognises that there are both significant benefits and drawbacks behind the utilisation of pre-employment genetic screening. It identifies that currently there are over 1300 diseases that can be readily tested for through the use of genetic tests and similarly indicates that common diseases such as cancer and other not so prevalent genetic illnesses such as Huntingtons can be tested for. Information that has been presented and published surrounding the annual cost of employee absence further demonstrates and validates reasoning behind some conclusions that have been drawn to surrounding the benefits to economy and the impact on employees and likewise, presents viewpoints and data (see Figure 3) that supports other views expressed such as "people should not be evaluated on things that they cannot control".

When considering the validity of the article, it can to an extent be deemed valid. This is because the article provides supporting evidence and qualitative data through the use of judgement and opinion to present both sides of the pre-employment genetic screening issue and likewise has

published relevant information including what the procedure involves as well as ~~what~~ the potential for great benefit ("could be lifesaving") it has. The article throughout continually weighs up both sides of the argument and uses statistics and professional advice / input to support this and so can be considered valid.

In terms of reliability, firstly, the information that has been provided by Figure 2 hasn't been provided alongside the revenues that if the employees were at work they would make. Therefore, results cannot be tested for statistical significance and therefore, although the proposed costs of employee absence is provided, due to no comparative of the scale of the problem, the article fails to highlight the significance of the data provided in Figure 2. Following on from this, the article fails to demonstrate the economic impact of employees with genetic illness during a time of absence. Whilst Figure 2 highlights the cost of absence currently, the article makes no prediction as to what this would look like once pre-employment genetic screening is in place and so therefore, some conclusions surrounding the true impact on employment and economic 'burden' is not illustrated, which overall questions the reliability of conclusions presented.

Leading on from this, Figure 3 demonstrates the view of the general population. There are questions into the reliability of these results because a relatively small sample size of 2,928 people was used and this sample was taken from the general public. The problem with this is that although the study is representative of the whole population, it fails to identify the significance of those surveyed. This is because of the 83:17 that voted against the use, a large proportion of these could be

employees and therefore would not wait genetic testing to impact employment opportunity but similarly, a small proportion asked could have been employees and so would make up less of the total surveyed which could be a valid reason behind why there was a small proportion in support (5%).

Another factor that indicates levels of reliability is the number of scientists used within the "one of the UK's largest academic collaborations". This increases validity because the study used 200 scientists that came from all over the UK. Therefore, a large and broad range of scientific knowledge and skill was included within the study and so anything that was published using this study can be considered reliable.

The response below shows a partially developed discussion that considers some different aspects. The presentation of the issues surrounding pre-employment genetic screening is discussed, mostly supported by a consideration of how the article has interpreted and analysed the scientific information to support the conclusions/judgements being made and the validity and reliability of data. Therefore, this response was awarded 7 marks in band 3.

The article is aimed mainly at the general public as it doesn't use too many scientific terms and is relevant to employers and employees of any jobs.

The article uses a study from Wellcome Trust Case Control Consortium to show the increased amount of knowledge on genetic diseases. The source is reliable as it was made up of "50 research groups" and ~~was~~ was conducted in the UK. The study itself was reliable because it used 120,000 people as a sample size which is very large and representative of the population. There was 200 scientists that worked on the study so ~~the~~ it is very unlikely any errors were made and they managed to analyse almost "10 billion" pieces of data."

The study is also valid as it was used to find and research genetic diseases which is exactly what it is used for in the article making it a strong piece of evidence.

The article states that more studies can help understand how diseases occur. This was a quote from a Professor Donnelly at the University of Oxford. Professors are likely to know a lot about the health issue they are talking about. This makes his statement very reliable. As well as that, the article uses his statement correctly and doesn't misquote him.

Indirect discrimination is one of the factors that could arise from genetic screening. The article uses this to show the negative side of the procedure. This statement comes from the American Journal of Medicine. This is a journal meaning it has been peer reviewed. This means experts in the field have reviewed this paper and decided it can be published in a Journal. However, the article was written recently but this journal came out in 1992. This means it could have lost some of its relevance. The article also uses mostly sources from the UK

however this source is from America indicating it might not be suitable for a UK audience.

The article uses a study (figure 3) to show the general population's views on pre-employment genetic screening. Figure 3 was done in 2009 making it older compared to more recent studies. It also doesn't state who was surveyed. The study was done using the general public however different people may have bias views for example unemployed people, bosses or people suffering from genetic diseases may be swayed by other factors. On the positive side, the study does use a large sample size of 2,028 people meaning it is mostly valid and reliable to the article's audience.

The article states that genetic screening can be unreliable and doesn't fully predict if someone will get a disease. There is a lack of evidence or reference in this part of the article meaning it could be unreliable.

The response below gave a partially supported discussion on the validity of the article. There is some confusion about what the terms validity and reliability mean. However, there is some coherence in the response and was placed in band 2, awarded 5 marks.

the article presents us
 with a lot of scientific information
 such a figure 1. this shows
 us from 1993 - 2005 the
 number of test for genetic screening
 has increased from just over 100 in
 1993 to 1300 in 2005. this is
 showing us that ~~to~~ these
 test are becoming more readily
 available for employers to buy ^{and cheap}
 as well as showing that tests
 for genetic screening is well
 researched into showing it's reliable
 as well as ~~is~~ between
 2007 and 2009 the Wellcome

Trust core consortia did one of the largest studies where they released the results for the most common genes that caused genetic disorders. This took 120,000 people genes and saw which genes caused common genetic disorders. The article has shown this as an easier way for the employers to find out what genetic disorders that their employees have and then can make a valid judgment. I think that this study was ^{quite} reliable as they used a large number of people to analyse their gene. This means that there would have been ~~many~~ lots of it to analyse. As well as it was run by different scientists that teamed up. This shows us that it is reliable as lots of people worked on one project and the scale was large. Another piece of information the article presents us with is Figure 3 this is where they asked for the public's opinion on whether they would genetic screenings be used to decide whether you set a job

or not. 83% of people were
 against employers using genetic
 screening. The presents the arguments
 of people refusing to do it or not.
 However the number of people asked
 was about 2000 so the group
 was kept small. to get a true
 or more accurate value they
 should have asked more people
 so I think this piece of data
 isn't very reliable

Question 2

Discuss the key factors affecting the pre-employment genetic screening issue.

(16 marks)

Learners were not always clear about identifying the implications of the issue of pre-employment genetic screening and some were less able to fully explain the impact by linking the implications to relevant economic, social, ethical, and environmental factors. Weaker learners simply described material from the article; they demonstrated limited understanding of the issues or impacts, and their discussions often lacked structure. This paper aims to assess understanding of content in articles, alongside specific biology knowledge. Some learners demonstrated a lack of scientific literacy in their response to this question. Some learners approached the task rather mechanistically by listing the factor as a sub-heading, thus indicating a lack of ability to synthesise the information across all the factors. The learners could have benefitted by using short quotes and statistics from the article to support their ideas throughout their response. High scoring candidates demonstrated comprehensive knowledge and understanding of the scientific issue and structured their discussions by selecting and using relevant material from the article. They produced coherent and logical accounts and discussed links to and between the factors.

The response below has selected relevant information and developed a discussion that draws a good range of links to and between ethical, social, environmental, and economic impacts. In the response shown below, the learner has achieved 13 marks, which is at the bottom of band 4.

Firstly, there are a considerable number of social factors that affect pre-employment genetic screening. To begin with, genetic screening has the capability for detecting over 1300 diseases. It can determine whether or not an individual is at risk from developing a disease. This has detrimental impacts socially because, if pre-employment genetic screening was to take place, this could result in individuals becoming unemployable. This in turn not only impacts them socially in terms of their mental health from potentially considering themselves to be 'useless' or discriminated against, this also impacts individual economically as not being able to work or perhaps not being able to access a more highly paid job will result in less income and so will impact the way an individual leads their life. In addition to this, pre-employment genetic screening will result in varying forms of discrimination which is unethical and will also, in terms of levels of equality a human has right to but again socially, causes great mental impact. Contrastingly, pre-employment genetic screening has the potential to be socially beneficial. This is because being able to identify the predisposition will enable workplaces and the family and friends of the individual to recognise a potential underlying condition and become better equipped to deal with any of the individual's potential needs in the future allowing them to access "more personalised treatments".

Leading on from this, there is great ethical and moral standpoints to be considered. To begin with, conditions such as ~~near~~ AMD could result in people being "turned down for jobs that require good eyesight". The

moral factor to consider here is that should older people be selected for genetic screening before applying for this type of job because of their age. This would mean that older people would be being discriminated against and would be made to have a test even if they are not currently suffering from the disease. In doing so, the genetic screening could undiscover older genes that are known to cause disease and so would result in people being told they would not be allowed to work in case their predisposition was to result in development of disease. On the counter arguments if by not carrying out pre-employment screening and an employee did have an underlying genetic disease, the employer could be putting someone in greater danger depending on the nature of the job. Therefore, a social and moral benefit is that by screening, danger from some jobs could be eliminated.

A significant environmental factor that impacts this issue is the nurture perspective. Many diseases are "complex" and are "part nature part nurture". Therefore, some people could already be predisposed to genetic disease whilst others could cause development of genetic diseases such as cancer, as a result of the nurture side of the argument. As a result of this factor it could therefore be argued that if genetic disease can be a result of an individual's environment then subsequently this would imply that there is potential for everyone and especially those with genetic predispositions to develop genetic diseases and so as a result pre-employment screening would need to occur on nearly every potential employee. The economic impact of this would be unmanageable. This is because not only would carrying out genetic screening be expensive and time consuming, the number of people that as a result of screening and would not be able to work will increase. Therefore, employment sector will be

exposed to reduced workforces which could result in business failure and as
 demonstrated previously in Figure 3, the annual cost of employee
 absence is in the billion region and so testing someone for genetic disease
 would positively impact this figure as there is likely to be less work absence if
 employees have no underlying or diagnosed condition and so therefore
 healthy. ~~Another~~ contrastingly, a significant economic burden of
 pre-employment screening is that a genetic screening result could be
 a false positive. Therefore, there would be a large number of screenings that
 are expensive and false and utilize for both the employee and potential
 employer, capable individuals that would be an asset to a business as
 being restricted due to an unsuccessful screen.

In the response below, the discussion after the learner's plan shows sustained and logical connections made to the article through the selection of relevant aspects to support their answer, but demonstrates good, rather than comprehensive, knowledge and understanding of the key factors affecting the issues surrounding pre-employment genetic screening. This response was awarded 10 marks in band 3.

Ethical:

- Unethical that a test that can't guarantee a person will develop anything so it shouldn't determine if someone gets the job
- Indirect discrimination?

Social:

- negative consequence of pre-employment genetic screening: could impact someone's mental health
- lead to indirect discrimination towards minor ethnic groups
- Economic
 - £9 million on study that was most successful academic ~~collaboration~~ collaboration
 - genetic screening possibly expensive ^{but became quick and cheaper so}

Environmental:

- our genes interact with our environment and lifestyle
- Environment could possibly influence "false positives" if someone lives in a polluted area could get a false positive ^{test} ~~blank~~ once more

Key factors affecting the pre-employment genetic screening issue could be due to the social, economical, environmental and ethical opinions.

One key factor affecting the genetic screening issue would be the social factor. ~~purposefully~~ Society plays a role in genetic screening due to the negative consequences the pre-employment screening could leave someone feeling if they failed. This could lead to someone's mental health being affected massively as they could be seeing people around them happy that they passed the genetic screening but then the person that failed possibly didn't know they had a genetic disease that could affect them. This has an affect on society because they probably have no say, meaning the situation is in control of what they do with their lives.

Another key factor could be ~~the~~ an economical. affect this is because so much money could've get spent on these ~~tests~~ ^{screenings} for people to not get the results they were expecting so they could feel like money has been wasted. However, the government would probably profit off of everyone doing these tests as they could be getting funded by organisations.

Environmental affects would be another key factor to pre-employment genetic screening issue. After the WTCC study was done the chairman of WTCC said genes interact with our environment and lifestyle. I believe that is how some people could've been affected from this screening. If this is the cause it could play a part in why people received false positive. If someone lived in a polluted ~~environment~~ environment it could possibly affect ~~them~~ their screening test as a respiratory disease for ^{example} ~~ext~~ as it'd affect their lungs and possibly heart.

Lastly, there could be an ethical affect from the pre-employment genetic screening issue because the screening is affecting people's futures and deciding their future for them. It could be unethical that a genetic screening ~~is~~ is basically evaluating people's health, that cannot be controlled, so instead of an employer looking at an applicants skills and knowledge ~~that~~ they'd rather look at their predisposition to a genetic condition. This could be unethical as it is basically telling people if they have a condition they were most likely unaware of ~~they~~ ^{then} they don't get the job which could be stressful, draining and frustrating.

The response below was at the bottom of band 2 and was awarded 5 marks. It demonstrated adequate knowledge and understanding of the key factors affecting the issues surrounding pre-employment genetic screening.

Genetic screening in regards to being for an employment purpose is a highly ethical debate. Do employers have the right to potentially discriminate someone who will suffer no debilitation from their disease. The main issue is informed consent, because employees have to consent before they are screened and without this it cannot happen. The employers want this screening to happen to mostly benefit themselves, to gain them a workforce who are healthy and to also cut down insurance costs. Many individuals would be discriminated against for their disease, they could be placed in inferior positions or poor jobs, or be turned down from jobs immediately. For genetic screening highly educated and skilled scientists are needed, this means we need to encourage the children in education to enter healthcare science fields. This might be a growing problem facing society as we don't have enough people to fill these positions. Such as nurses and paramedics are given loans bursaries to encourage them into these professions, it means that the government may have to roll out additional funding to encourage

people to enter these professions, when the whole science industry is heavily funded already and the government is under constant stress. Would these genetic screens actually be able to meet demands if employers were given the go ahead to test employees. If only 1,300 people were tested by their own choice in 2005 can these demands be met as the United Kingdom's population is at 67 million, with at least 75% of these people in employment. Should genetic screens be given to everyone when they may not even have a genetic disease so it may not be necessary. The issue of false positives and negatives is alarming. As people who receive false positive go under unnecessary emotional stress they put a strain more on public resources such as counselling services which cost money both to the individuals and society. And false negative tests mean that people are not informed of a genetic disease which would be prevented and treated in better time. For example, as someone's condition worsens they will be admitted to hospital and they will require more urgent treatment with stronger drugs and more intense therapies. This will put an unnecessary strain on the NHS when it could

have been prevented in the first place and treated in a more timely and less intensive manner. If it is pre-employment screening should it become pre-education screening so individuals can be guided on what courses to take to lead them into the correct profession in the first place. However, pre-employment genetic screening does have it's benefits when it displays the results. Scientists could investigate more into how and why these diseases occur, treatment plans could become more personal to better treat an individual for their genetic disease. If someone is screened for a disease they have the potential to alter their lifestyle to prevent the disease from occurring, they could also inform their children if these diseases run down the family and offer their support. Individuals could be placed in more comfortable jobs which are better for their welfare and knowing they have a genetic disease could bring together people around them such as family members and co-workers. It must be noted that everyone has the right to know if they have a genetic disease, chance of developing one so they can make an informed decision, but also seek the help of professionals such as genetic counsellors. (Total for Activity 2 = 16 marks)

Question 3

Explain how different organisations/ individuals influence the pre-employment genetic screening issue.

(10 marks)

This question seemed the most improved by the learners as they showed a more advanced understanding of the influence which organisations and individuals could have on an issue. Most learners identified some organisations, many identifying the WHO, the Wellcome Trust Case Control Consortium and some individuals named in the article. Some learners tended to work through the article and then the references, making a comprehensive list of the organisations and individuals mentioned, however this did not provide the required explanation. Some learners remained unclear about how the various organisations could influence the development of ideas on the issue by, for example, carrying out research or by influencing political policy worldwide.

The response below has been awarded full marks for this question. It has selected a number of organisations and individuals from the article and has given reasoned lines of argument to give the possible influences each could have within the issues of pre-employment genetic screening. This response achieved full marks and was awarded 10 marks in band 3.

The Wellcome Trust Case Control Consortium ~~conducted~~ influenced the pre-employment genetic screening issue by conducting research on the genetics behind common diseases such as diabetes. Although the WTCCC may have a national influence within the UK, the research provided information and released them to the public which could have raised awareness of the issue of ^{the} pre-employment genetic screening issue. Raising awareness of this issue allows the public to understand what could happen if the pre-employment genetic screening occurs and it also helps the public develop opinions on the issue which could be used to aid the Government in concluding this issue ^{whether} ~~whether~~ or not genetic screening should occur in the pre-employment genetic screening issue.

The World Health Organisation (WHO) also influence the pre-employment genetic screening issue by stating scientific information. The WHO has said that genetic screening may identify the individuals predisposition for a certain disease but however cannot guarantee a person will develop it. As the WHO has a global influence, the WHO may have provided further information and further reassurance on genetic screening. National healthcare

organisations such as the NHS gather their information from their own research and from the WHO which means that the public would understand the issue further ~~and~~ ^{with} true information from the WHO and not ~~the~~ fake conspiracies or theories that they might have heard.

The Institute of directors influence this issue by carrying out a survey in which employers are in favor of using genetic screening. This gives an insight on what the ~~employers~~ ^{employers'} opinions may be which could also ~~and~~ aid in the Government's decision to either let genetic screening occur or not. The Institute of directors may have a ~~great~~ ^{national} influence within the UK meaning that results of the survey could influence public views too.

Pharmaceutical industries also influence the pre-employment genetic screening issue by promoting genetic screening services which receive the money spent on research and gene patents. By doing so Pharmaceutical industries may also develop genetic screening tests which influence this issue as without the genetic testing, the pre-employment genetic screening can not occur. Promoting genetic screening services also raises concern and awareness about the genetic screening issue as they can provide further information about genetic screening which could be presented to the public.

(Total for Activity 3 = 10 marks)

The response below identifies organisations and individuals and attempts to explain how they may influence the pre-employment genetic screening issue, occasionally supported through some linkage and application to the article. This response was awarded 7 marks in band 2.

The World Health Organisation is a very big global organisation that heavily influences the pre-employment genetic screening issue. This is because the information is heavily trusted, as it is carried out by specific scientists, and released on a global scale. This is read by people all over the world, as well as influencing the decisions of governments, which means that WHO has a huge influence on this issue.

Forbes is a very big company which deals with financial information, which would have much less influence, if any on this issue, as even though Forbes' influence is on a global scale, its main field is not science, therefore people wishing to find out more about this issue would not look at Forbes as it doesn't publish scientific information.

Marcel H. from the American journal of medicine would have a large influence on this issue.

This is because he works for a scientific journal which means the information is from a reliable source. This would influence other scientists the most as the information is of

a high level and in their field of study. This means that it would have an influence on studies scientists may want to carry out, as they would look to trusted, peer reviewed information first.

The House of Lords Science and Technology Committee would have a big influence on this issue as it is a government run organisation. This means that the information could have a potential bias due to political views, however would still be fairly reliable, and would influence government decisions and possibly doctors who work for the NHS, as that is influenced by the government.

~~Genetech~~ ~~is~~ ~~an~~ ~~organisation~~ ~~which~~
Day 6, from the Institute of Directors research paper ~~is~~ would have a wide influence on people's views on the issue. This is because they surveyed people on their opinion. This means that the general public would be influenced by this more heavily compared to people in this field of study as it is ~~more~~ ~~broadly~~ ~~biased~~ information. However people in this field of study will be ~~be~~ able to take into account the information to incorporate it into their own views, thus influencing many people on this issue, nationwide.

(Total for Activity 3 = 10 marks)

The response below identifies the WHO and the Wellcome Trust Case Control Consortium. The reference to its influence is basic. There is little explanation and the knowledge shown in the response is only just adequate for top of band 1 and was awarded 3 marks.

The ~~at~~ world health organization is a globe organization, which influenced the pre-employment genetic screening issue by discovering that the genetic researching can only identify the predisposition for a certain disease but can not guarantee the person will develop the genetic disease which is shown

An other organization which influenced was The Wellcome trust case control consortium which is a group of 50 research groups which researched the genetics which was behind common genetic diseases such as diabetes, rheumatoid arthritis and coronary heart disease. The WTCC found out that they are an increase of genes which can cause genetic the common genetic diseases.

The healthy and safety commission
are against excluding a person
from a work place that might
develop a genetic disease. The UK
government have concluded that
~~pre-screening~~ pre employment genetic
screening is not currently occurring
with in the work place.

Question 4

Suggest potential areas for further development and/or research of the pre-employment genetic screening issue.

(6 marks)

There were some excellent and creative suggestions for further research such as advancing technology and expanding the number of conditions and diseases which could be tested for. A number of learners discussed ideas that would reduce the ethical issues which could be associated with pre-employment genetic screening due to false positives. More able candidates synthesised the suggestions for improvement from the article and used evidence to explain why these improvements were necessary. Unfortunately, some learners misread the question and described how the article's style could have been improved. Rather than just extending the ideas given in the article for areas of further development, learners should suggest their own ideas within the context of the issue.

The response below has been awarded maximum marks for this question. The learner has included a range of their own ideas, which were not part of the given article, to suggest and explain a number of potential areas for further development and/or research of the pre-employment genetic screening issue. The response demonstrates accurate and detailed knowledge and understanding of pre-employment genetic screening. Not only has the learner provided their own ideas within the context of the article, (which is beyond the expectations of the question as learners are only expected to extrapolate from the details in the article), they have also provided a description of their ideas which are support throughout with linkage and application to the article. This response was awarded 6 marks in band 3.

Epigenetics should be considered alongside genetic screening, as this also investigates how lifestyles and environments can actually affect our health. This would widen our knowledge on genetic diseases, and with the important factor that epigenetics can be turned on and off it could also prevent these diseases from escalating. Epigenetics states that our current choices could affect the two generations after us, this highlights its importance even more as this isn't just affecting one person in one generation within a family. Genetic screening could also be used to investigate different ethnicities' susceptibility to developing a disease and seeing if this can be linked to their ethnicity. Then more funding and research can be put into this issue to help minorities within society. Genetic screening is heavily advanced and is not very widely publically available, there would be research into the development of more accessible screening for poorer and less developed countries so they are not put at a disadvantage compared to the rest of the world. However, healthcare is still an issue in less developed countries so this issue

develops further than just making the screening more accessible, healthcare in general needs to be more accessible to these communities / countries. The chance of false reading tests should aim to be eliminated so unnecessary stress isn't caused or people are rightly told they have a disease and are provided with the support that they need. Could there be screening put in place for more mental diseases than just physical ones, such as this could enable a person to see if they are at risk for suffering from depression or they are currently diagnosed / suffering from a condition. Mental diseases can often go undiagnosed due to a doctor being bias and not diagnosing someone properly, and for some mental disorders there may be a wide variety of symptoms so it may be harder to diagnose finally, more research needs to go into actually treating genetic diseases, pharmaceutical companies should be more widely investigating drugs. Such as a cancer drug can be found to treat progeria, a life limiting disease so pharmacists should be widening their horizons and not limiting the potential use of

(Total for Activity 4 = 6 marks)

In the response below, the learner has presented a range of well synthesised areas for possible development and has used evidence from the article as well as their own knowledge to support their decisions, however the response has not given fully developed lines of argument. Therefore, it was placed at the top of band 2 with 4 marks.

Firstly, if the pre-employment genetic screening ~~is~~ process was to be utilised in the employment process, the scale of the associated discrimination as a result of this needs to be understood. The article highlights that there will be forms of discrimination however there needs to be further research into how many people would be directly or indirectly discriminated against in the process.

Following on from this, there needs to be a basic level of understanding on the percentage of people that would have their job application accepted or rejected in order to further understand the impacts of genetic screening because the article doesn't predict comparison of percentages for job applications that could be potentially rejected in comparison to those accepted as a result of an potential employees susceptibility.

Following on from this, the article does not provide any data or estimations on how much the pre-employment genetic screening will cost the individual businesses and organisations and likewise fails to weigh up the economic cost to the NHS and so this needs to be further researched.

There also needs to be further research and development into the accuracy of these tests. This is because the article highlights that there may be false positive results but again, doesn't provide data to suggest the ~~screening~~ accuracy rates of ~~these tests~~ in order to establish a cost-benefit analysis. For example, of 1000 people ^{screened} ~~tested~~, how many of the 1000 could potentially receive a false positive result and then become unemployed as a result of ~~test in~~ ^{screening} inaccuracies.

In the response below, the learner has demonstrated isolated elements of knowledge of the health issue and provided limited identification of areas for further development and/or research. The response is a band 1 answer and was awarded 2 marks.

A further development for pre-employment genetic screening can be to develop the genetic screening more, this make the screening more accurate this can ~~maybe~~ ^{maybe} tell ~~if~~ whether the employee will definitely get the genetic disease, or not develop the disease at all. This will be able to help the work places to be able to make a decision ~~to~~ whether to employ the person or not. It will also help with the mental health of the employer by them knowing if they will develop ~~at~~ a genetic disease or not.

A further research can be the amount of people who actually develop the genetic disease after they was tested positive via the genetic screening. This will show the chances of people who will develop a genetic disease.

A common incorrect approach seen in some response, as seen below, was learners suggesting improvements to the article. This is not the focus of the question and learners should be advised against this.

for figure 2 a further development of the research they gave. I would like to know how the number of tests used for genetic screening to the current year.

I would like to know how many employees that ~~are~~ screen underwent genetic screening were laid off or turned down. Also to hear an employee/applicant's opinion that was turned down opinion of on genetic screening and how it impacted them.

A new study of figure 3, with a bigger sample size. I want to know their opinion of genetic screening, and also if they are aware of the ~~it, please~~

The ~~res~~ research into the impact of genetic screening, e.g. mental health, struggles with finding a job and the money lost.

Question 5

A recent news headline said:

UK employers push for pre-employment genetic screening.

You have been asked to write a letter to the House of Commons Science and Technology committee to argue against the use of pre-employment genetic screening.

When writing your letter, you must consider:

- who is likely to read your letter
- what you would like the reader to learn from your letter.

You should not include any personal details in your letter, e.g. your address.

(16 marks)

The vast majority of learners gave a response for this question, suggesting that time management across the paper has improved since the previous series.

Most learners showed awareness of their audience and wrote their response with appropriate tone, authority and terminology, A few learners did not consider who would be likely to read the letter and had a very informal tone. This question gave the more able learners a chance to show the understanding of the issue and to write in an appropriate style. Good responses provided an introduction, a balanced discussion of the advantages as well as the disadvantages and issues of pre-employment genetic screening with a persuasive tone and with a clear conclusion.

The example below is a very good response that synthesises information from the article to present a balanced discussion. The response shows a well-developed structure that is clear, coherent, and logical. The learner demonstrates a comprehensive understanding of the audience and purpose of the letter through use of appropriate writing style and terminology throughout the majority of the response. The learner summarises and usually draws together key information using elements from the article to support their argument and so the response was slightly weaker for the first trait in the level based mark scheme, but strong in the second and third trait, therefore it was placed at the bottom of band 4 and awarded 13 marks.

Dear the House of Commons Science and Technology
committee,

I am writing to you today to debate the recent
headline in the news, and why you should oppose
it. The headline said 'UK employers push for pre-
employment genetic screening'. I will discuss why
this is not essential to our workforce and why
you should nit back the statement.

Pre-employment genetic screening screens
individuals for genes which may lead to disease.
genetic screening however isn't simply a yes or no
answer to saying whether an individual has a
disease.

There are many drawbacks if employers gained
permission to screen their employees. genetic
screening is not 100% reliable and could create

more problems than it would solve. Screens could come back as false negatives which could put someone in extreme danger, or a false positive which could mentally and emotionally harm an individual and the people around them. Also how would we provide genetic screening for the percentage of the UK population who are in employment as that is millions of people. To give out screening just for employment purposes would be unfair and unethical as it means that students, unemployed and retired people would not be screened. Also if someone is screened and a genetic disease is found it may not even develop so this could lead to discrimination in the workplace, especially towards certain ethnic groups who have slightly different genes and predispositions.

However, pre-employment genetic screening could be beneficial as individuals would be able to make informed decisions regarding their own health and employment choices. It can lead to companies having to pay less money for insurance as they have a more able-bodied workforce. But it is not all about money, it is also about the welfare of individuals;

no one should be discriminated against for their health and genetic diseases are not something which is shameful and should be eradicated from society.

Genetic screening for employment purposes is just not essential to our society and it will unnecessarily take up resources that we don't even have the resources or funding for.

Funding should be going towards people who are suffering from genetic diseases and need treatment. Individuals can choose to access genetic screening at any time, for their own concern, not their employers, through the national health service or privately.

The response below was placed at the bottom of band 2 and was awarded 8 marks. The learner has summarised the key information and evidence from the article, but it could have given more depth and support from the article using quotes or numerical data.

Dear Sir/Madam,

I am writing to you as I disagree with UK employers using pre-employment genetic screening. I feel outraged that I should ~~be~~ or should not be hired for a particular job depending on any ~~of~~ genetic predisposition.

I believe that performing these pre-employment genetic screenings is unethical as it can lead to discrimination as a result of gene variations not being distributed evenly in different ethnic groups. Furthermore, by being genetically screened and then rejected ~~from~~ by an employer for a disease ~~that~~ ~~is~~ that

would not affect my work would not be fair nor reasonable. In addition, information such as this is private and confidential to me, as a result I would not feel comfortable with an employer ~~to~~ having this sensitive information and keeping it on their system. I am not the only person who feels this way, a study of 2,028 people concluded that 83% of the people ~~opposed~~ opposed the genetic screening for the reason that they did not want to be evaluated on a biological factor that they cannot control. I believe that someone should be hired in relation to their skills/knowledge instead of their genetic predisposition. Applying for a job and being rejected due to ~~my~~ ^{their} predisposition to a genetic condition could mentally impact an individual.

In conclusion, I would like you to consider and learn what an individual such as me would go through if pre-employment genetic screening was something I had to go through whenever I would apply for a job.

The example below was awarded 4 marks at the top of band 1. The learner has attempted to provide some of the main points, but these are vague and not supported by relevant evidence. They have not selected appropriate material from the article. The learner shows little awareness of the audience and does not use appropriate scientific terminology throughout the response. This response shows some structure and coherence but is too vague.

To the House of Commons Science and Technology committee

As you may have heard in the recent news headline, UK employers are pushing for pre-employment genetic screening. I am against this matter and it is my purpose to influence you into rejecting the idea of using genetic screening.

I represent the public for being against the idea of pre-employment genetic screening and is so the majority of the public. A 2009 study asked 2009 every-day people if they were against or for the idea with 83% voting against this idea.

The chairman of UKACC Peter Dorely come forth and said that diseases are part nature

and future, meaning we may not even develop a disease that we are at risk of getting because it's in our genes and we haven't contacted an external factor that will increase the likelihood of developing. WHO also agrees ~~with~~ with the unfairness, those who have a predisposition for a disease doesn't mean they will develop it.

Summary

Question 1:

The key focus of this question is the validity of the judgements being made by the article, so candidates must identify what the conclusions are and whether these are justified and supported. While candidates need to be clear about validity and reliability, they must be taught to be able to recognise and articulate the evidence for this within the article. Learners could consider the following:

- Support for the ideas in the article,
- Contradictions or errors,
- References,
- Expertise of the named individuals and organisations,
- Bias within the article
- Sample size and detail in the data.

The question requires a discussion so positives and negatives must be drawn out.

Candidates should try to avoid reliance on generic statements such as the number and currency of references.

Question 2:

Learners should clearly establish the scientific issue/issues before examining evidence from the article for the implication areas. Responses that simply take an implication-by-implication approach are unlikely to show links to and between implication areas.

Although a high number of marks are allocated to this question, learners must be careful to manage their time so that they do not spend too long on this question.

Question 3:

Candidates must provide more depth than simply provide a list of organisations/individuals mentioned in the article.

Responses need to consider how wide and deep the organisation or individual's sphere of influence is in respect of the scientific issue. Consideration of a range of different organisations or individuals will allow candidates to discuss different viewpoints and motivations.

Learners would only be expected to use the information from the article, but may have some personal knowledge of organisations listed in the specification, such as the NHS which would develop their response.

Question 4:

Identification of areas for further research or development within articles is a good starting point, but learners must be able to extrapolate from this within their own suggestions and ideas. Learners can be creative using the lines of argument from the article.

Question 5:

Candidates need to respond to the format of the evidence required by the question e.g. a report would generally be expected to have a title, introduction/background, discussion, and conclusion/recommendation, a letter could have a more conversational tone but should be suitable for the recipient and purpose. However, letters should not contain any personal information, e.g. address, and do not have to be signed by the learner.

Responses need to consider the target audience. Some key considerations are who is the audience, what is relevant to the audience, what is the level of understanding of the issue, what should be the tone that they are addressed in, and should the evidence be advising or informing.

Candidates must be careful to manage their time throughout the paper to ensure that they have enough time at the end to provide a response to this question.



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