Characteristics of Victims of Cybercrime

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1.1 Executive summary

1.1.1 Key findings

i. Vulnerabilities to cybercrime vary among male and female of different AGE groups, and importantly, different types of areas they live at.

ii. Females are much more likely to become victims than male towards two types of cybercrimes: 'Harassment/Unwanted contact', and 'Sexual/Indecent'.

iii. 16-35 year females are more vulnerable to 'Harassment/Unwanted contact' type cybercrime.

iv. 16-25 year females are much more vulnerable to 'Sexual/Indecent' type cybercrime.

v. 16-45 year both males and females are particularly vulnerable to 'Fraud/Theft/Handling' type cybercrime.

vi. The likelihood of becoming victim to 'Harassment/Unwanted', 'Fraud/Theft/Handling' and 'Sexual/Indecent' type cybercrime decreases with the increase of AGE.

vii. Females living in areas with higher number of Professional occupations, and managers/directors/senior officials, skilled trade, Level 3 qualifications are more likely to become victim to 'Harassment/Unwanted contact' than areas with lower number of the above mentioned six categories.

viii. Both males and females living in areas with considerably higher number of Full Time Students and Asian are more likely to become victim to 'Fraud/Theft/Handling' than lower level of these two categories.

ix. 16-25 years females living in areas with higher number of full time students are more likely to become victim 'Sexual/Indecent' type than lower number of full time students.

x. In the hotspots areas of cybercrime victims (where more than 3 or 4 number of incidents reported from same post-code), majority of the victims are 16-25 year females (48.2%). In addition, more than half (54.5%) of the males are from Bradford and more than half (51.1%) females are from Leeds in these hotspot areas of cybercrime.

1.1.2 Brief summary of core dataset

First recorded: 01/07/2014
Last recorded: 30/06/2016
Total cases recorded: 7364
Total cases included in the final analysis: 4092 (after deletion of missing data with either AGE or GENDER)

1.2 Preliminary basic statistical analysis on four different types of cybercrime

Figure 1 Breakdown of four different types of cybercrime victims
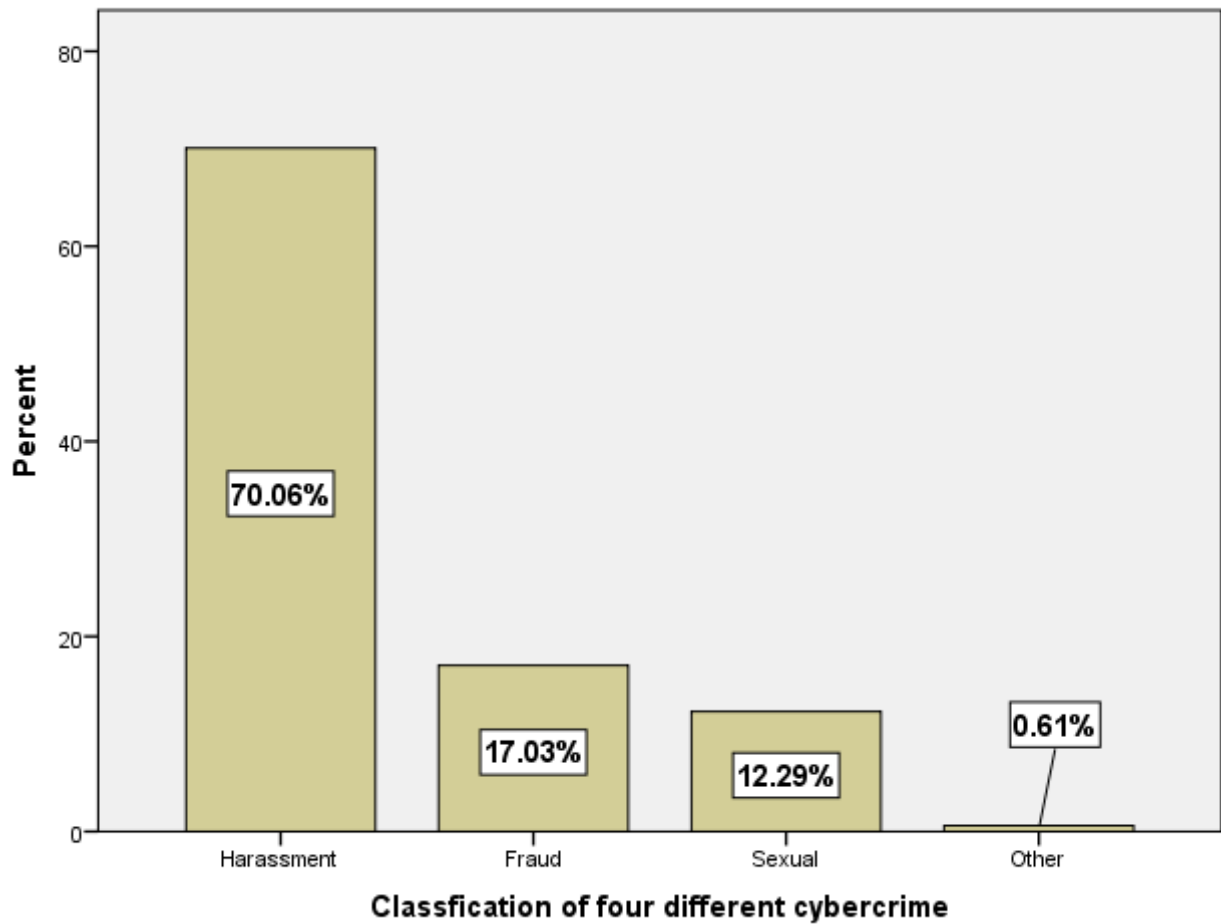
1.3 Cybercrime victims in West Yorkshire

1.3.1   Demographics of victims (AGE, GENDER)

Figure 2 GENDER of the victims
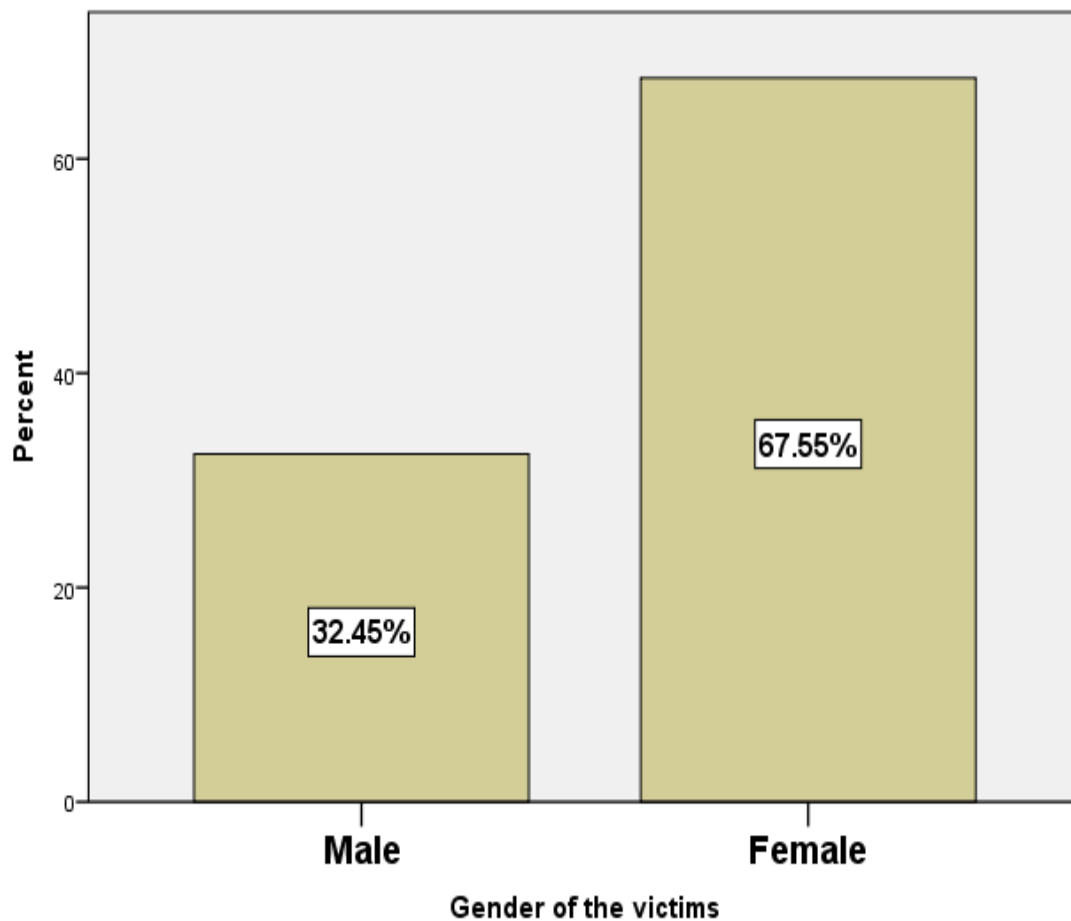
Figure 3 Distribution of victims' ages in seven groups
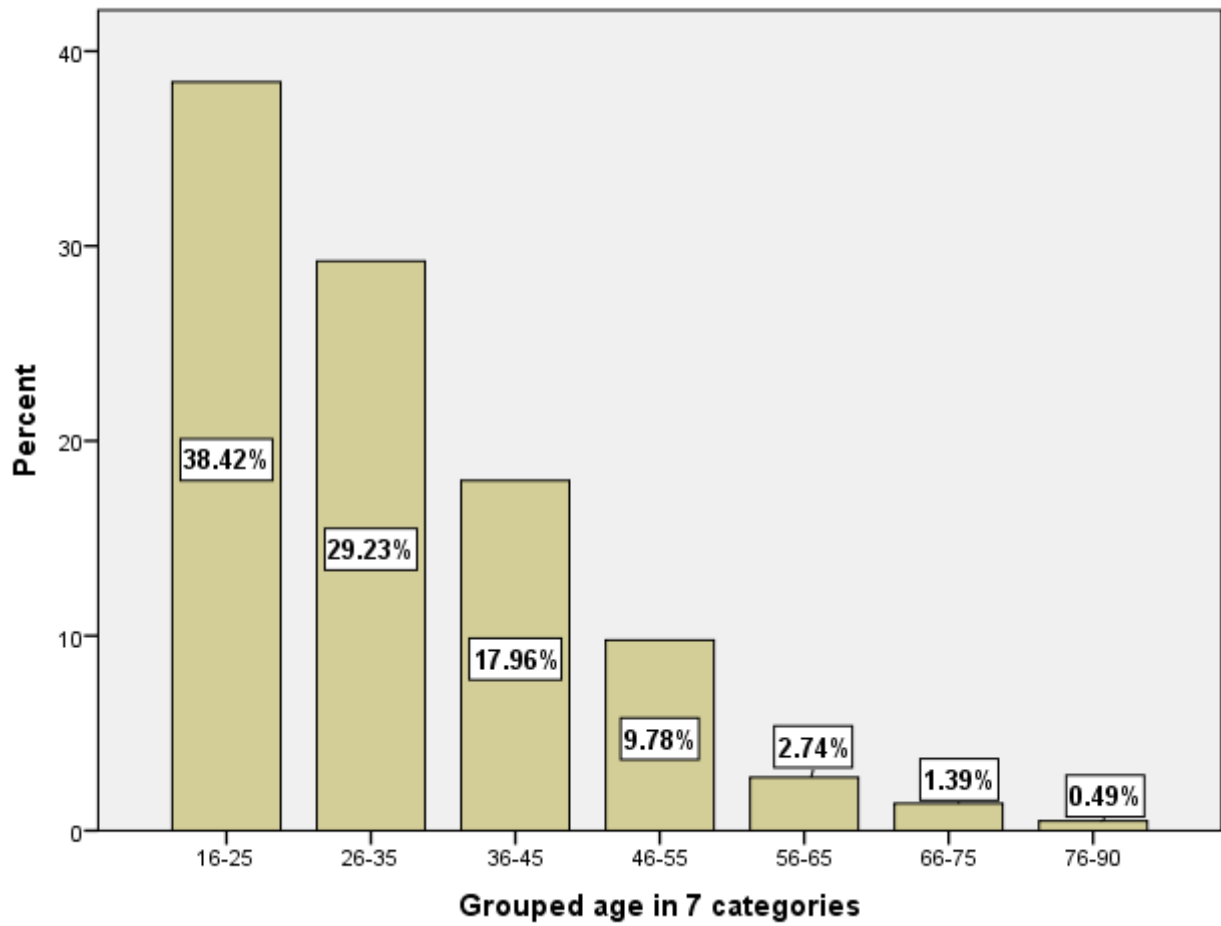
1.3.2 Geographical characteristics of cybercrime victims

Figure 4 Distribution of cybercrime victims' districts in West Yorkshire
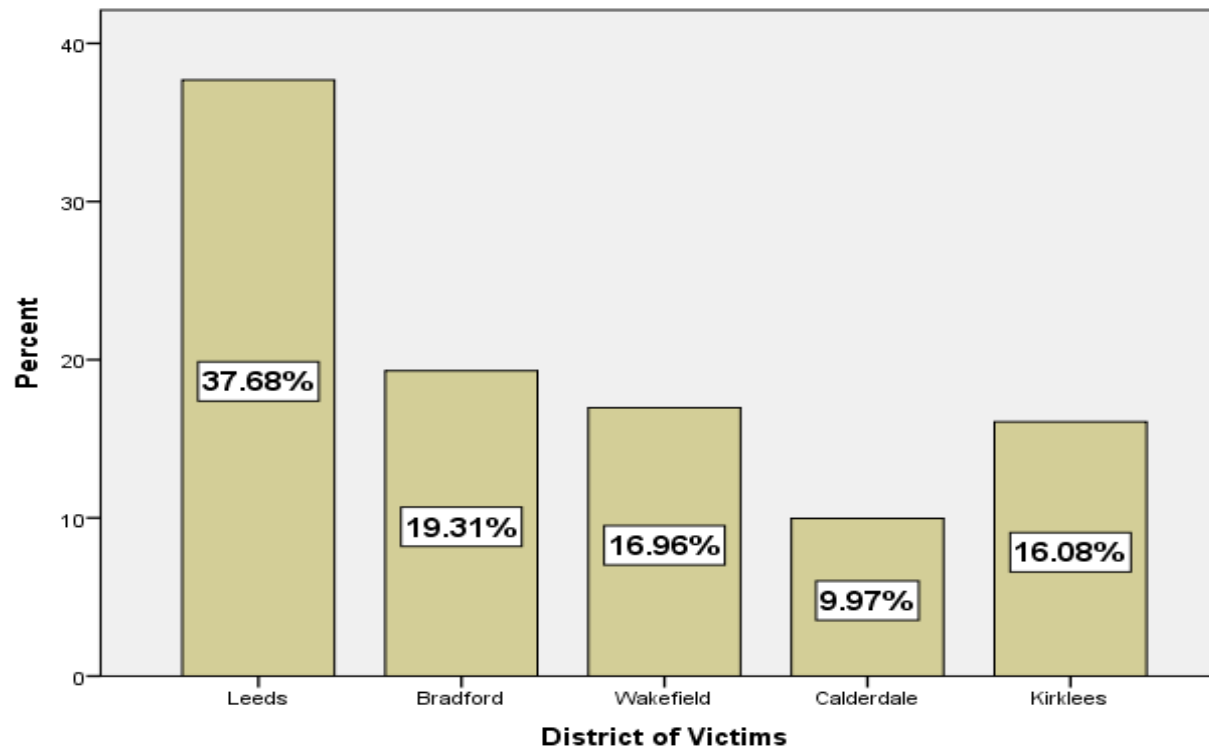
Figure 5 **Distribution of cybercrime victims of different districts in West Yorkshire**

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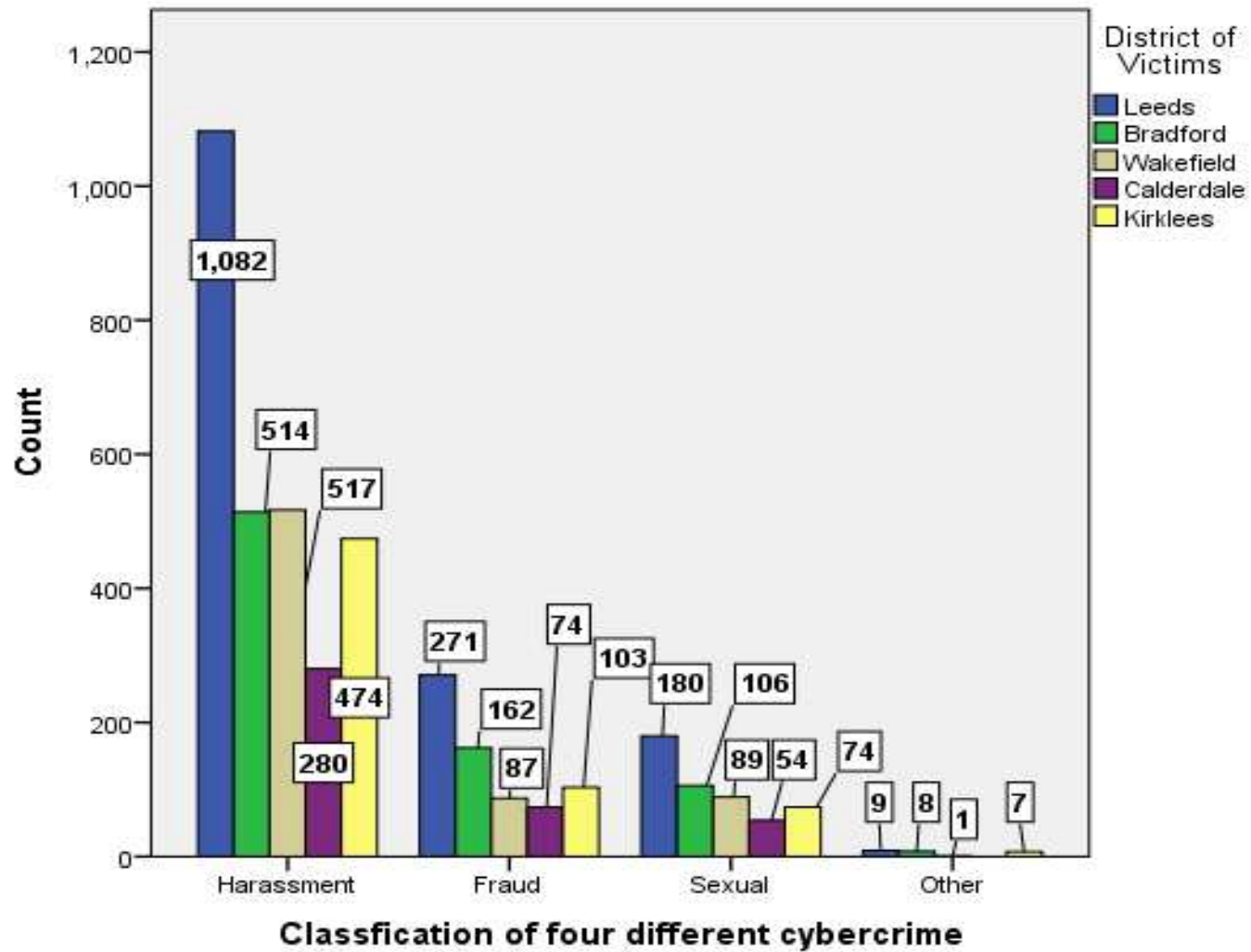
Figure 6 Distribution of male and female cybercrime victims in West Yorkshire's districts
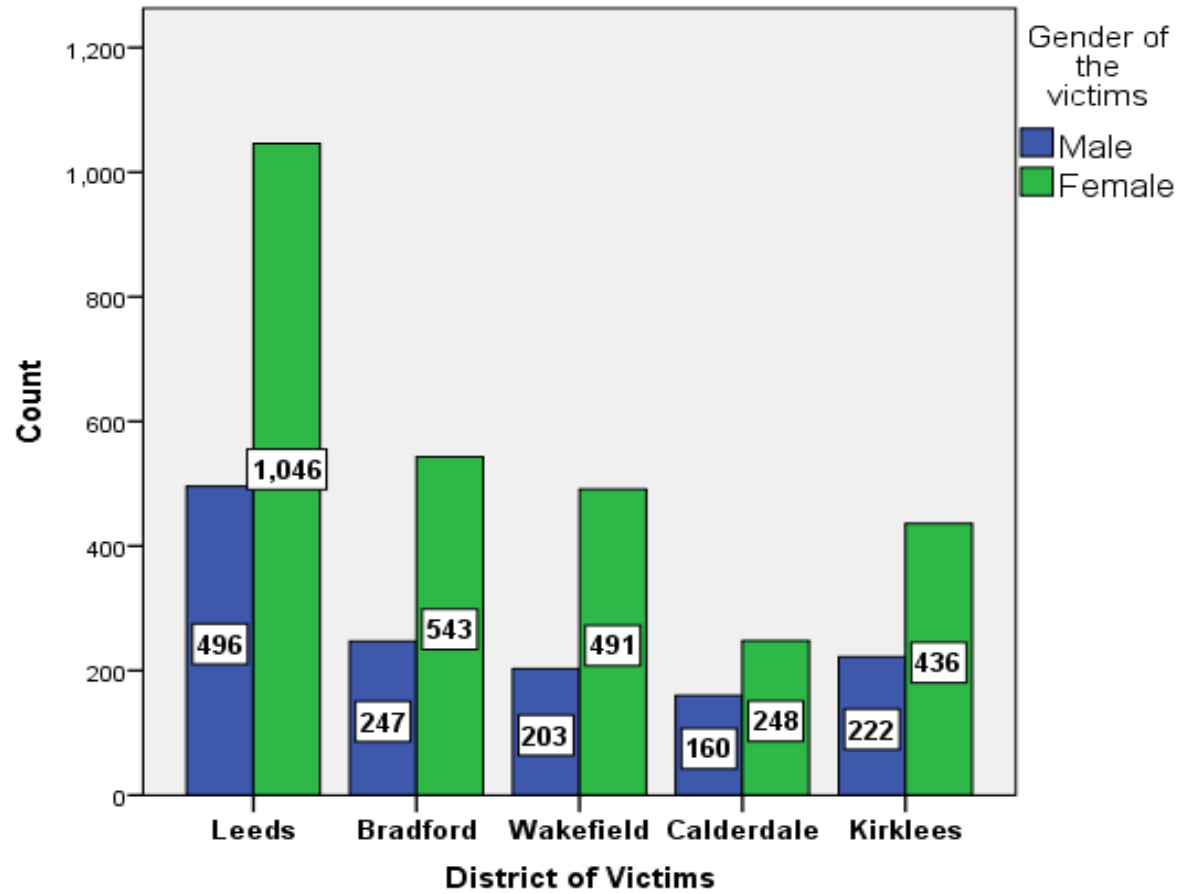
1.4 Five different dimensions of area characteristics (Factorial Ecology)

This research has considered 28 different area level measures fall into four different categories (Ethnicity, Qualification, National-Statistics Socio-Economic Classification, and Occupation). A principal component factor analysis has been conducted to reduce the measures. Based on the similarities among the measures, five distinct dimensions have been identified. The measure that loaded highly (>.7) in each dimension have been considered to develop the latent class area profiles of cybercrime victims.

Table 1 Rotated Component Loadings from Factorial Ecology

Rotated Component Matrix[a]

Area variables	5 distinct area profiles				
	Managers/Directors/ Professional/Level_4 Qualification/ Economically Active (Full Time)	Level 1 Qualification/ Skills trade/ Economically Active (Part-time)	Level 3 Qualification/Full Time Students /Sales Customer Service occupations	Asian/ Economically Inactive / Never worked	Mixed Multiple ethnic group / Long term unemployed
Ethnicity					
White	.198	.447	.616	-.495	-.104
Mixed Multiple Ethnic Group	.053	.018	.284	.162	**.741**
Asian	-.010	.050	.092	**.951**	.064
Black	.018	-.095	.166	.147	**.706**
Arab and other Ethnic Group	.171	-.251	.310	.436	.307

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Qualification					
No Qualification	-.577	.481	-.045	.410	.068
Level_1 Qualification	-.037	**.764**	.185	.284	.158
Level_2 Qualification	.228	.608	.627	.010	-.033
Level_3 Qualification	.124	-.052	**.955**	.007	.057
Level_4 Qualification	**.902**	-.095	.260	.085	-.003
Other Qualification	.032	.015	.455	.673	.231
NS-SEC (National Statistics Socio-Economic Classification)					
Economically Active Employee Part-time	.189	**.799**	-.052	.216	-.025
Economically Active Employee Full-time	**.724**	.515	-.026	-.212	-.051
Economically Inactive Retired	.088	.309	-.059	-.161	-.526
16 To 74 Long Term Unemployed	-.401	.253	-.100	.149	**.744**
Never Worked Long Term Unemployed	-.287	.181	-.047	**.818**	.374
Never Worked	-.230	.145	-.030	**.880**	.249
Long Term Unemployed	-.401	.253	-.100	.149	**.744**
Full Time Students	.063	-.134	**.954**	.120	.113

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Occupation					
Managers All Directors Senior Officials	**.774**	.257	-.057	-.035	-.238
Professional Occupation	**.925**	-.037	-.021	-.025	-.048
Associate Professional Technical	**.876**	.144	.136	-.143	-.052
Administrative Secretarial	.660	.433	.117	-.154	-.205
Skilled Trades	.242	**.702**	.030	-.172	-.201
Caring Leisure Other Service Occupations	.133	.663	.219	-.188	.165
Sales Customer Service Occupations	.123	.255	**.831**	.134	.073
Process Plant Machine Operatives	-.208	.644	.018	.400	-.049
Elementary Occupations	-.272	.326	.665	.100	.281
Mean	.000	.000	.000	.000	.000
Standard deviation	1.0	1.0	1.0	1.0	1.0
Range	-2.071 to 8.517	-3.827 to 4.164	-0.959 to 26.133	-2.736 to 6.241	-2.41430 to 6.88497
Eigenvalue	7.046	6.177	3.546	2.649	1.715

Extraction Method: Principal Component Analysis.

 Rotation Method: Varimax with Kaiser Normalization.

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a. Rotation converged in 8 iterations.

In total, 17 measures have been identified in five different dimensions. We then divided each area measure into three categories: **Low** (below 25th percentile), **Medium/Average** (between 25th and 75th percentile) and **High** (above 75th percentile).

The details of percentiles of each measure are presented below:

1.5 Dividing area characteristics into Low, Medium/Average and High category

1.5.1   Level 4 Qualification (Degree (for example BA, BSc), Higher Degree (for example MA, PhD, PGCE), NVQ Level 4-5, HNC, HND, RSA Higher Diploma, BTEC Higher level, Foundation degree (NI), Professional qualifications (for example teaching, nursing, accountancy)

Level 4 Qualification		
N	Valid	4092
	Missing	0
Mean		50.31
Median		39.00
Mode		17
Percentiles	25	25.00
	50	39.00
	75	67.00

1.5.2 Economically Active Employee Full-time

Economically Active Employee Full Time

N	Valid	4092
	Missing	0
Mean		83.24
Median		79.00
Mode		70
Percentiles	25	61.00
	50	79.00
	75	100.00

1.5.3 Managers All Directors senior officials

Managers Director Senior Officials

N	Valid	4092
	Missing	0
Mean		11.60
Median		9.00
Mode		7
Percentiles	25	6.00
	50	9.00

75	15.00

1.5.4 Professional occupation

Professional Occupation

N	Valid	4092
	Missing	0
Mean		18.70
Median		14.00
Mode		8
Percentiles	25	8.00
	50	14.00
	75	25.00

1.5.5 Associate Professional Technical

Associate Professional Technical

N	Valid	4092
	Missing	0
Mean		14.92
Median		12.00
Mode		9

Percentiles	25	8.00
	50	12.00
	75	20.00

1.5.6 Level 1 qualification (1-4 O Levels/CSE/GCSEs (any grades), Entry Level, Foundation Diploma, NVQ level 1, Foundation GNVQ, Basic/Essential Skills)

Level 1 Qualification

N	Valid	4092
	Missing	0
Mean		36.52
Median		36.00
Mode		34
Percentiles	25	28.00
	50	36.00
	75	44.00

1.5.7 Economically Active Employee (Part time)

Economically Active Employee Part Time

N	Valid	4092
	Missing	0

Mean		32.28
Median		32.00
Mode		33
Percentiles	25	25.00
	50	32.00
	75	39.00

1.5.8 Skilled Trades

Skilled Trades		
N	Valid	4092
	Missing	0
Mean		15.97
Median		15.00
Mode		17
Percentiles	25	11.00
	50	15.00
	75	20.00

1.5.9   Level-3 Qualification (2+ A Levels/VCEs, 4+ AS Levels, Higher School Certificate, Progression/Advanced Diploma, Welsh Baccalaureate Advanced Diploma, NVQ Level 3; Advanced GNVQ, City and Guilds Advanced Craft, ONC, OND, BTEC National, RSA Advanced Diploma)

Level 3 Qualification

N	Valid	4092
	Missing	0
Mean		33.57
Median		26.00
Mode		25
Range		1825
Minimum		3
Maximum		1828
Percentiles	25	19.00
	50	26.00
	75	34.00

1.5.10   Full-Time students

Full Time Students

N	Valid	4092
	Missing	0
Mean		29.37
Median		16.00
Mode		12
Range		2470
Minimum		0
Maximum		2470
Percentiles	25	11.00
	50	16.00
	75	23.00

1.5.11   Sales Customer Service Occupations

Sales Customer Service Occupations		
N	Valid	4092
	Missing	0
Mean		14.00
Median		13.00
Mode		14
Range		217
Minimum		1
Maximum		218
Percentiles	25	9.25
	50	13.00
	75	17.00

1.5.12 Asian

Asian

N	Valid	4092
	Missing	0
Mean		53.31
Median		10.00
Mode		0
Range		595
Minimum		0
Maximum		595
Percentiles	25	3.00
	50	10.00
	75	43.00

1.5.13   Never Worked Long term unemployed

Never Worked Long Term
Unemployed

N	Valid	4092
	Missing	0
Mean		23.35
Median		17.00
Mode		6
Minimum		0
Maximum		170
Percentiles	25	8.00
	50	17.00
	75	29.00

1.5.14 Never worked

	Never Worked	
N	Valid	4092
	Missing	0
Mean		17.08
Median		11.00
Mode		3
Range		155
Minimum		0
Maximum		155

Percentiles	25	5.00
	50	11.00
	75	21.00

1.5.15   Mixed Multiple Ethnic Group

Mixed Multiple Ethnic Group

N	Valid	4092
	Missing	0
Mean		8.50
Median		6.00
Mode		3
Range		96

Minimum		0
Maximum		96
Percentiles	25	3.00
	50	6.00
	75	12.00

1.5.16   Black

Black

N	Valid	4092
	Missing	0
Mean		10.12
Median		3.00
Mode		0
Range		205
Minimum		0

Maximum		205
Percentiles	25	1.00
	50	3.00
	75	11.00

1.5.17   Long Term unemployed

Long Term Unemployed

N	Valid	4092
	Missing	0
Mean		6.27
Median		5.00
Mode		3
Range		26

Minimum		0
Maximum		26
Percentiles	25	3.00
	50	5.00
	75	9.00

1.6 Latent Class analysis of profiles of cybercrime victims

1.6.1   Model I (AGE, GENDER and four different types of cybercrime)

<u>Model selection</u>

Table 2

Models	Number of Clusters	LL	BIC(LL)	AIC(LL)	AIC3(LL)	Npar	L²	df	p-value
Model 1	1-Cluster	-6042.5845	12118.4362	12093.1690	12097.1690	4	5786.6479	206	3.5e-1066
Model 2	2-Cluster	-4145.0872	8423.2431	8322.1745	8338.1745	16	1991.6533	194	2.5e-295
Model 3	3-Cluster	-3283.3698	6799.6098	6622.7397	6650.7397	28	268.2185	182	3.3e-5
Model 4	**4-Cluster**	**-3167.9461**	**6668.5637**	**6415.8922**	**6455.8922**	**40**	**37.3710**	**170**	**1.00**

The lower the value of LL, BIC, AIC (LL), AIC3 (LL), L^2 the better is the fit of the model to the data.

BIC, AIC and AIC3 are minimized at k=4 classes.

Goodness of fit (L^2) suggests k=4 is best.

We choose k=4. What we mean by that for the base model, we have chosen 4 cluster models.

The cluster profiles for the best four class solution for model I

Cluster description	Cluster1 (16-25, 26-35 year female Harassment/Unwanted cybercrime victim),	Cluster2 (16-25, 26-35, 36-45 year male or female Fraud victim)	Cluster3 (16-25 year female sexual/indecent cybercrime victim)	Cluster4 (Other types of cybercrime victims)
Cluster Size	**0.7006**	**0.1703**	**0.1230**	**0.0062**
Dependent variables				
Fraud				
Not a Fraud victim	1.0000	0.0003	0.9999	0.9983
Fraud victim	0.0000	0.9997	0.0001	0.0017
Harassment				
Not a Harassment victim	0.0000	0.9997	0.9997	0.9930
Harassment victim	1.0000	0.0003	0.0003	0.0070
Other				
Not a other types of cybercrime victim	1.0000	1.0000	1.0000	0.0099
Other types of cybercrime victim	0.0000	0.0000	0.0000	0.9901
Sexual				
Not a sexual cybercrime victim	1.0000	1.0000	0.0004	0.9988
Sexual cybercrime victim	0.0000	0.0000	0.9996	0.0012

Independent variables				
GENDER				
Male	0.2612	0.5696	0.3280	0.6800
Female	0.7388	0.4304	0.6720	0.3200
AGE Group				
16-25	0.3858	0.2468	0.5785	0.1200
26-35	0.3171	0.2310	0.2266	0.4800
36-45	0.1842	0.2166	0.1034	0.1600
46-55	0.0910	0.1435	0.0676	0.2000
56-65	0.0153	0.0818	0.0219	0.0000
66-75	0.0059	0.0545	0.0020	0.0400
76-90	0.0007	0.0258	0.0000	0.0000

70% of the victims fall in cluster 1 that is characterized by 16-25, 26-35 year female Harassment/Unwanted cybercrime victim.

17% of the victims fall in cluster 2 which is characterized by 16-25, 26-35, 36-45 year male or female Fraud victim.

12% of the victims fall in cluster 3 which is characterised by 16-25 year female sexual cybercrime victim.

Approximately 0.01% falls in cluster 4 which is characterised by other types of cybercrime victim.

Decreasing pattern of ages in cluster 1

Figure 7 showing decreasing pattern of ages in model with AGE and GENDER ('Harassment/Unwanted contact')
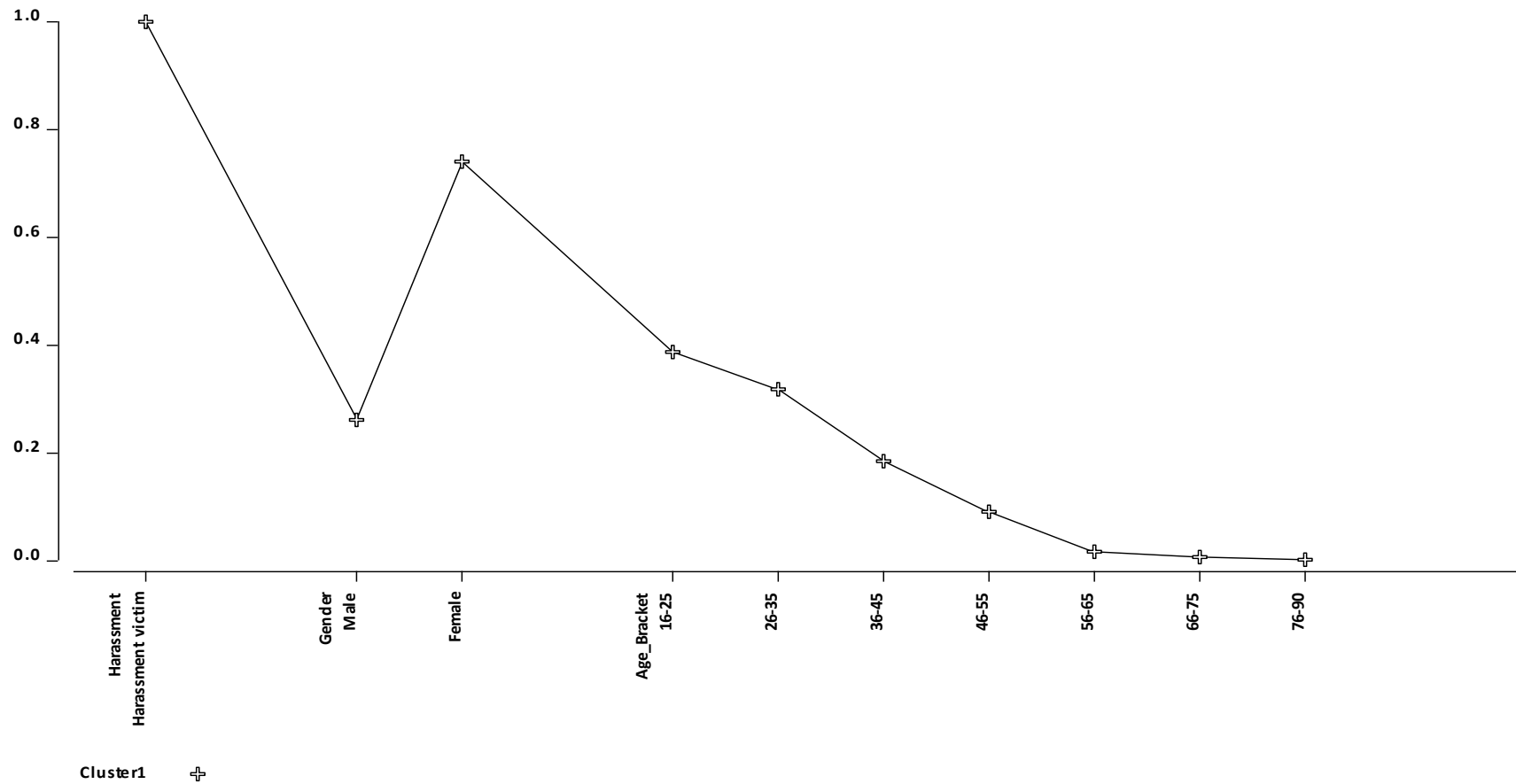
Decreasing pattern of ages in cluster 2

Figure 8 showing decreasing pattern of ages in model with AGE and GENDER ('Fraud/Theft/Handling' cybercrime victim)

We can see that larger proportion of 26-35 years male fall victims to in 'Other' types of cybercrime victims.

Figure 9 showing 26-35 years male victims to 'Other' types of cybercrime victims
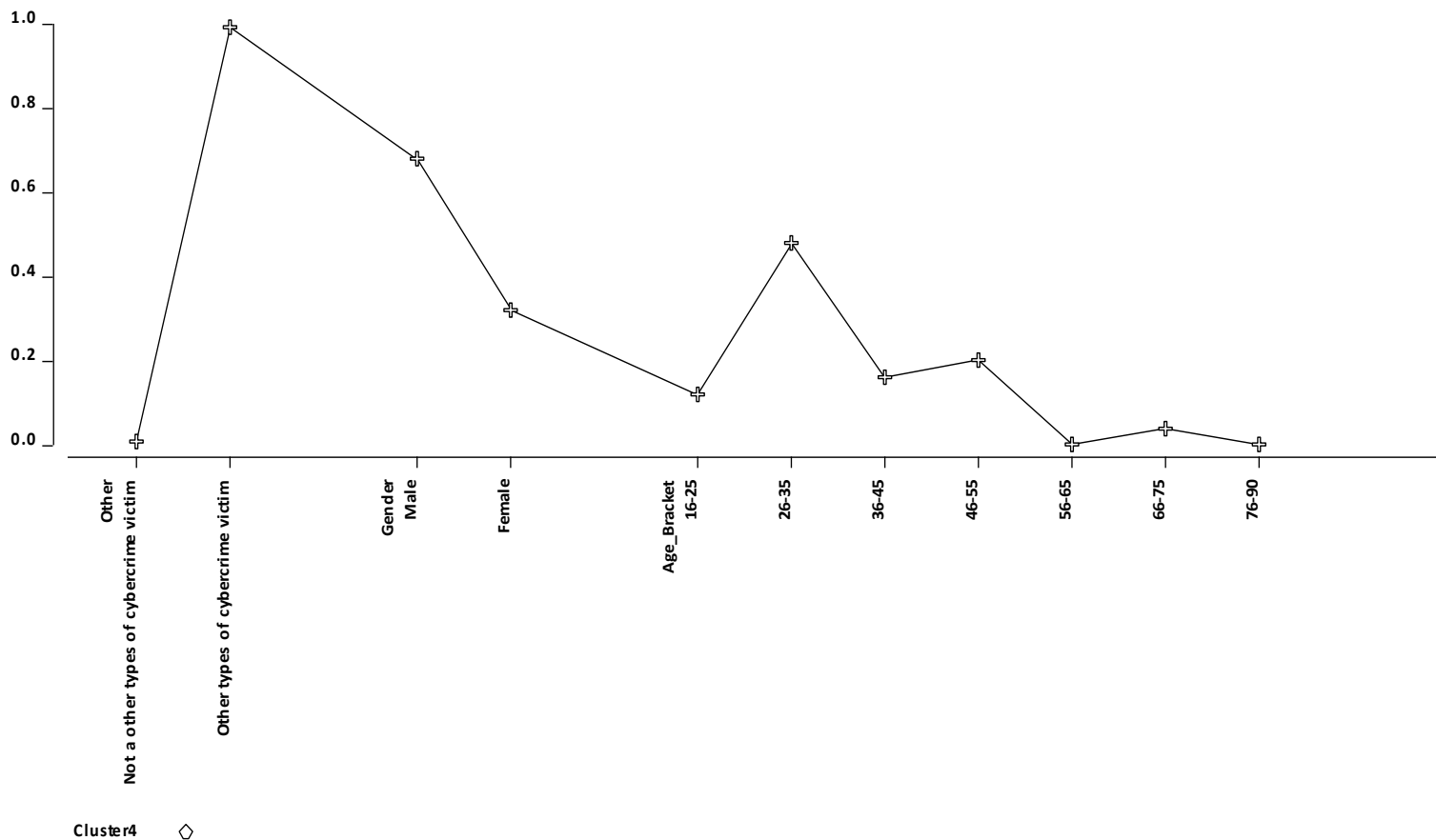
Findings from Model I (AGE and GENDER)

1.   16-35 year female victims are more likely to belong to 'Harassment/Unwanted contact' cybercrime victim.
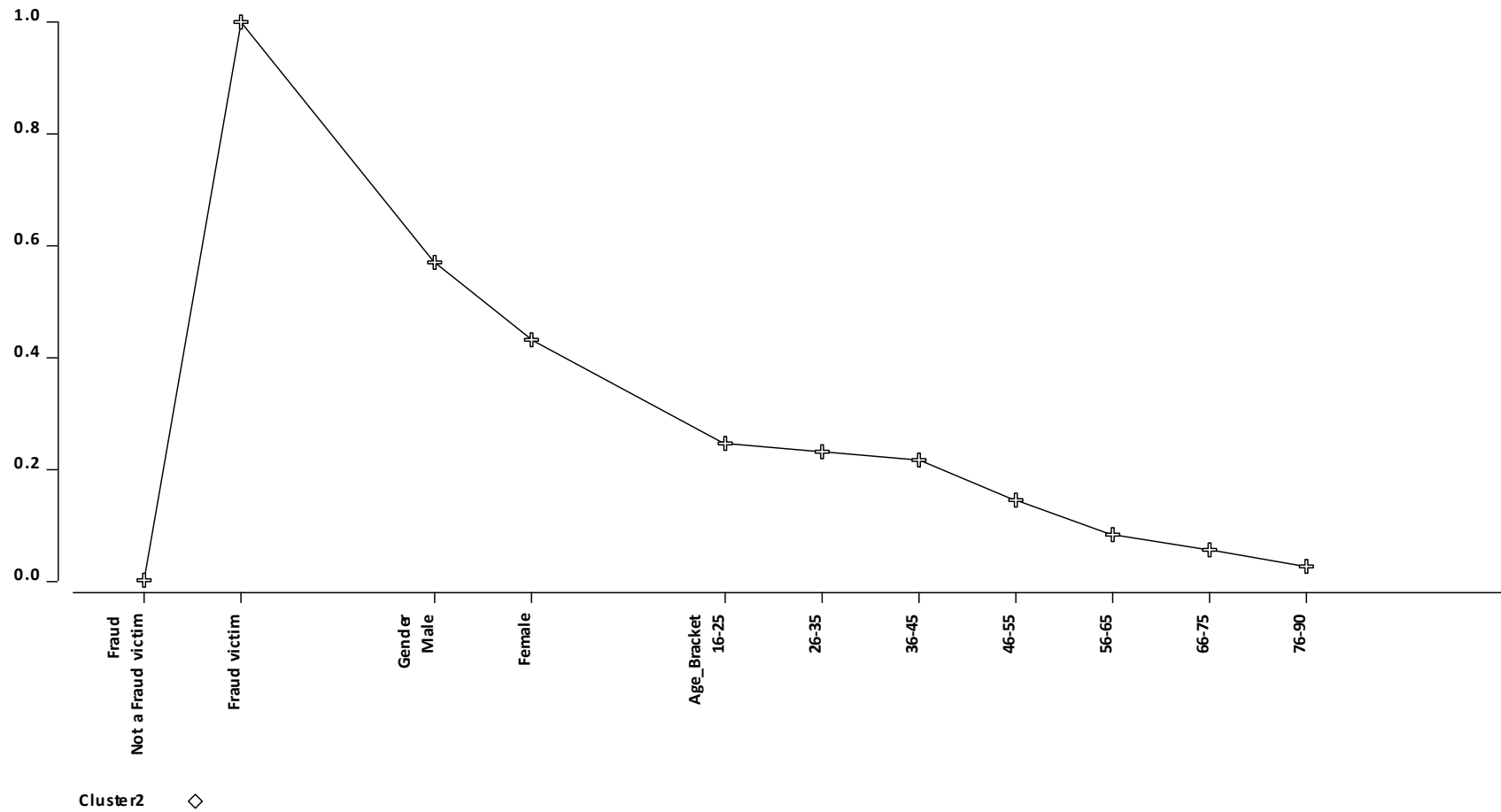2.   Male has higher probability than female of belonging to 'Fraud/Theft/Handling' cybercrime victim.
3.   16-25 years females are much more likely to belong to 'Sexual/Indecent' type cybercrime victim.
4.   26-35 years male are much more likely to belong to 'Other' types of cybercrime victims.

All the 17 area level measures have been tested in the process of model development to see if the area level measure makes any statistically significant contribution in the model. At the end, while developing the final model, we have added only 8 measures that fall in five distinct area profiles. The final model is discussed next.

1.6.2   Final model with Area Profile 1: Level4 qualification/Professional Occupation/Managers, Directors, Senior Officials, Area Profile 2 (Skills Trade), Area Profile 3 (Level 3 qualifications/Full Time students), Area Profile 4 (Asian), Area Profile 5 (Mixed Multiple Ethnic Group)

Class description	Cluster1 (16-25, 26-35 female Harassment/Unwanted cybercrime victim)	Cluster 2 (16-25, 26-35, 36-45 male or female Fraud victim)	Cluster3 (16-25 female sexual / indecent cybercrime victim)	Cluster4 (Other types of cybercrime victims)
Cluster Size	**0.7006**	**0.1703**	**0.1230**	**0.0062**
Dependent variables				
Fraud				
Not a Fraud victim	1	0.0003	0.9999	0.9983
Fraud victim	0	0.9997	0.0001	0.0017
Harassment				
Not a Harassment victim	0	0.9997	0.9997	0.9930
Harassment victim	1	0.0003	0.0003	0.0070
Other				
Not a other types of cybercrime victim	1	1	1	0.0099
Other types of cybercrime victim	0	0	0	0.9901
Sexual				
Not a sexual cybercrime victim	1	1	0.0004	0.9988
Sexual cybercrime victim	0	0	0.9996	0.0012

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Independent variables				
GENDER				
Male	0.2612	0.5696	0.3280	0.6800
Female	0.7388	0.4304	0.6720	0.3200
AGE Group				
16-25	0.3858	0.2468	0.5785	0.1200
26-35	0.3171	0.2310	0.2266	0.4800
36-45	0.1842	0.2166	0.1034	0.1600
46-55	0.0910	0.1435	0.0676	0.2000
56-65	0.0153	0.0818	0.0219	0.0000
66-75	0.0059	0.0545	0.0020	0.0400
76-90	0.0007	0.0258	0.0000	0.0000
Level4 Qualification				
Low	0.2637	0.1822	0.2445	0.2400
Medium/Average	0.4991	0.5194	0.4950	0.4800
High	0.2372	0.2984	0.2604	0.2800
Professional Occupation				
Low	0.2264	0.1636	0.2266	0.2800
Medium/Average	0.5183	0.5524	0.5089	0.4000
High	0.2553	0.2841	0.2644	0.3200
Managers/Directors/ Senior Officials				
Low	0.2456	0.2052	0.2704	0.2400
Average/Medium	0.4806	0.5079	0.4632	0.5200
High	0.2738	0.2869	0.2664	0.2400

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Skilled Trades			
Low	0.2257	0.2984	0.2565	0.2000
Medium/Average	0.4768	0.4534	0.4950	0.4000
High	0.2975	0.2482	0.2485	0.4000
Level 3 Qualification			
Low	0.2079	0.2123	0.2247	0.2400
Medium/Average	0.5420	0.5050	0.5050	0.6000
High	0.2501	0.2826	0.2704	0.1600
Full Time Students			
Low	0.2518	0.1765	0.1909	0.0800
Medium/Average	0.5072	0.4878	0.5229	0.5200
High	0.2410	0.3357	0.2863	0.4000
Asian			
Low	0.2473	0.1693	0.2048	0.0800
Medium/Average	0.5319	0.4835	0.5109	0.5600
High	0.2208	0.3472	0.2843	0.3600
Mixed Multiple Ethnic Group			
Low	0.2428	0.1822	0.2465	0.0800
Medium/Average	0.5096	0.5366	0.4990	0.5600
High	0.2476	0.2812	0.2545	0.3600

<u>Summary of findings for five area profiles</u>

▪ Majority of male and female victims with different AGE groups and vulnerabilities towards four different cybercrimes belong to the average/medium number of five area level measures. For example, 16-25 year female are more vulnerabilities towards 'Harassment/Unwanted contact' live in the areas with average/medium number of level 4 qualification, Professional occupation, Managers/Directors/Senior Officials, Skilled Trades, Level 3 qualification, Full Time students, Asian and Mixed Multiple Ethnic Group.

Figure 10 showing 16-25 year females victims living in areas with average number of level 4 qualifications, Professional occupation and Managers/Directors/Senior Officials

The chart shows values along the vertical axis from 0.0 to 1.0 with the following approximate data points:

- Harassment / Not a Harassment victim: 1.0
- Harassment victim: 0.0
- Gender / Male: 0.33
- Female: 0.67
- Age_Bracket / 16-25: 0.58
- 26-35: 0.22
- 36-45: 0.10
- 46-55: 0.07
- 56-65: 0.02
- 66-75: 0.0
- 76-90: 0.0
- Level4_Qualification_1 / Low: 0.24
- Medium/Average: 0.49
- High: 0.26
- Professional_Occupation_1 / Low: 0.22
- Medium/Average: 0.50
- High: 0.26
- Managers_Directors_Senior_Officials_1 / Low: 0.27
- Average?Medium: 0.46
- High: 0.27

Cluster3 ○

- Majority of 16-25 and 26-35 and 36-45 male and female cybercrime victims in 'Fraud/Theft/Handling' category have greater probability of belonging to areas with high number of Full Time students and Asian than areas with low number of these two categories.

Figure 11 showing higher probability of 16-25, 26-35 and 36-45 year male and female victims to belong to areas with higher number of Full Time students than Lower number of lower number of Full Time Students

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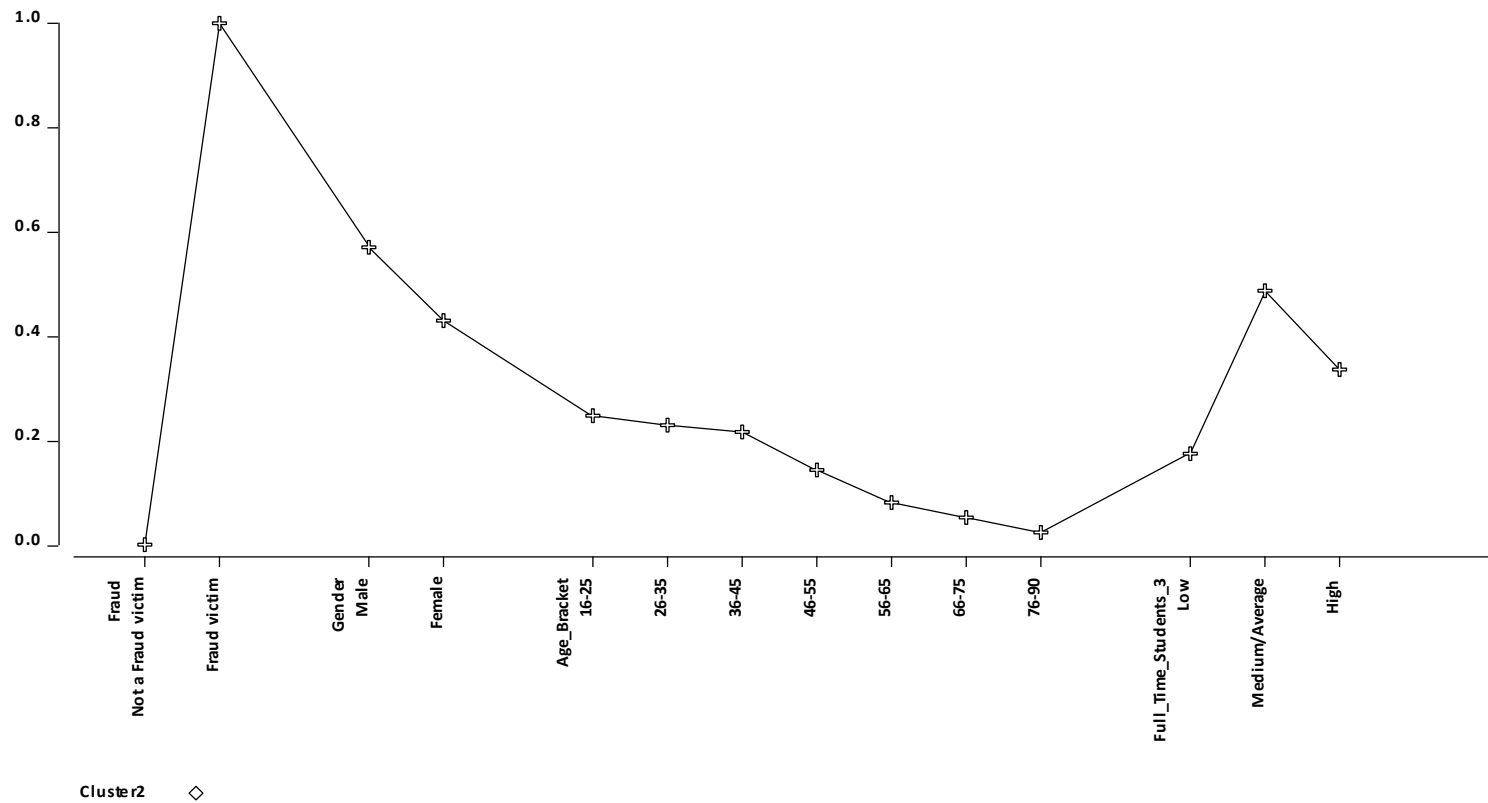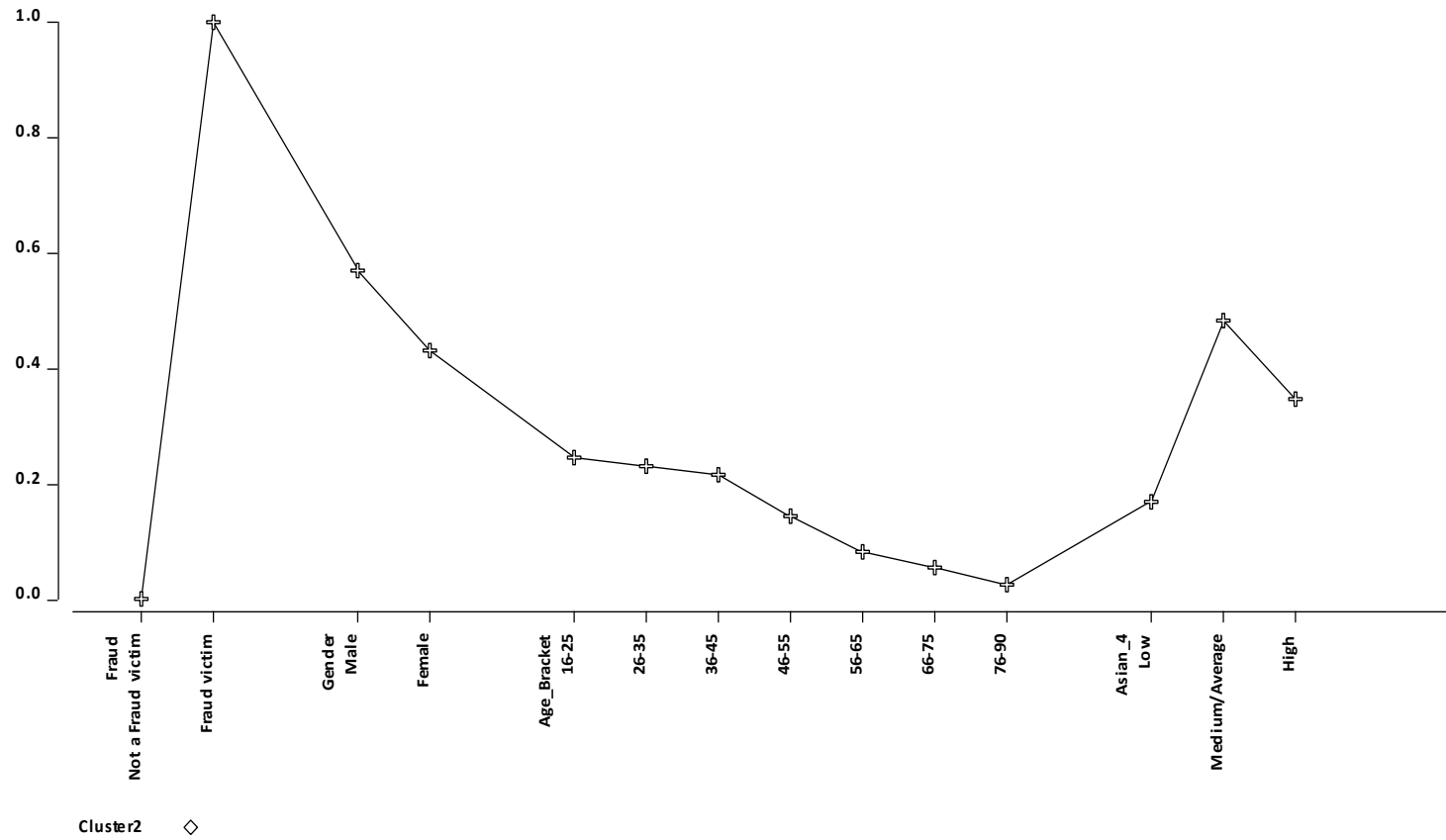Date 19/05/2017

Figure 12 showing higher probability of 16-25, 26-35 and 36-45 year male and female victims to belong to areas with higher number of Asian than Lower number of lower number of Full Time Students

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- Large proportions of 26-35 years male who are 'Other' types of cybercrime victims has greater probability of belonging to areas with high number of people with skilled trades, full time students, Asian and Mixed Multiple Ethnic Group than low number of these four categories.

Figure 13 showing higher probability of 26-35 year male 'Other' types of cybercrime victims to belong to areas with higher number of Full Time students than Lower number of lower number of Full Time Students
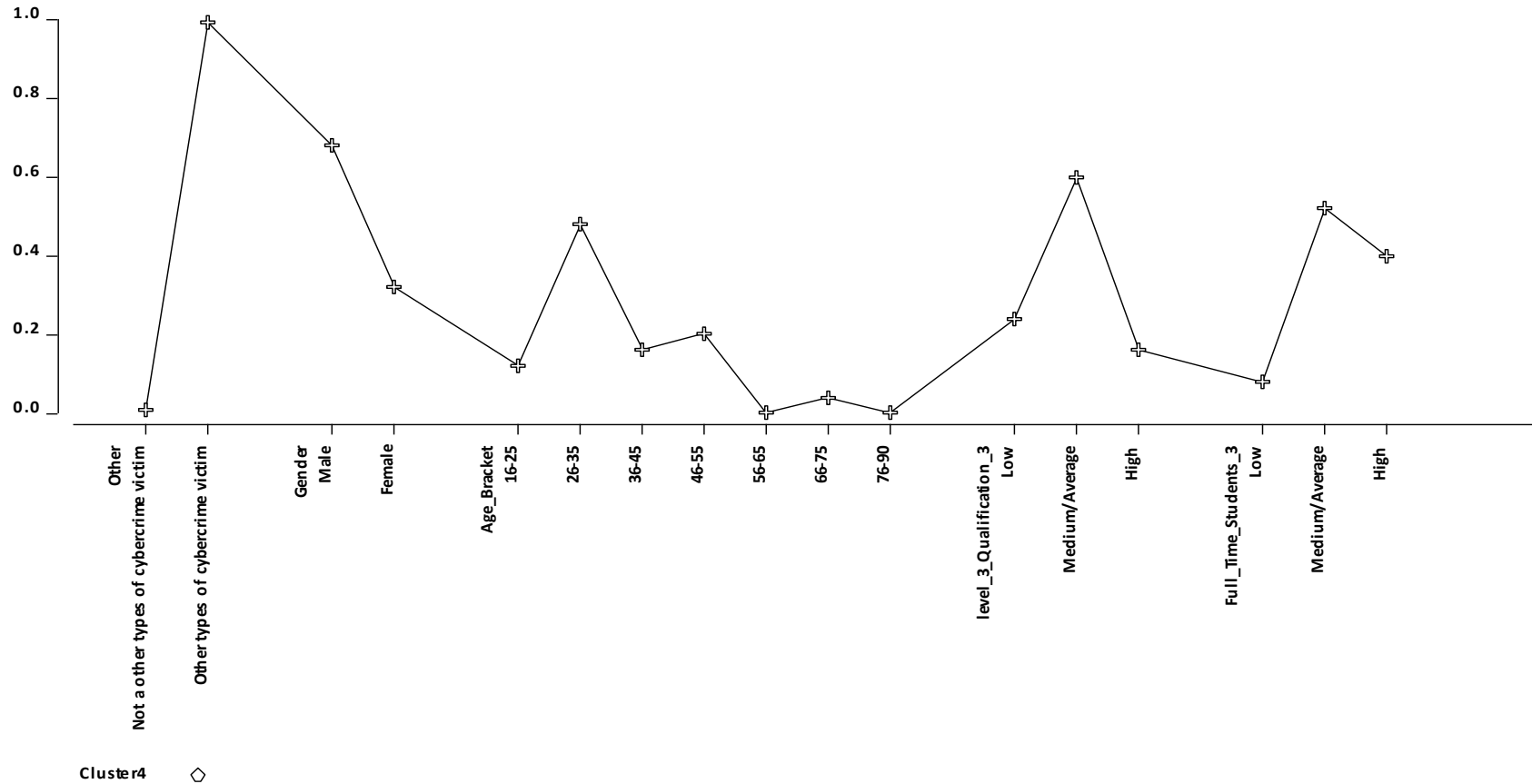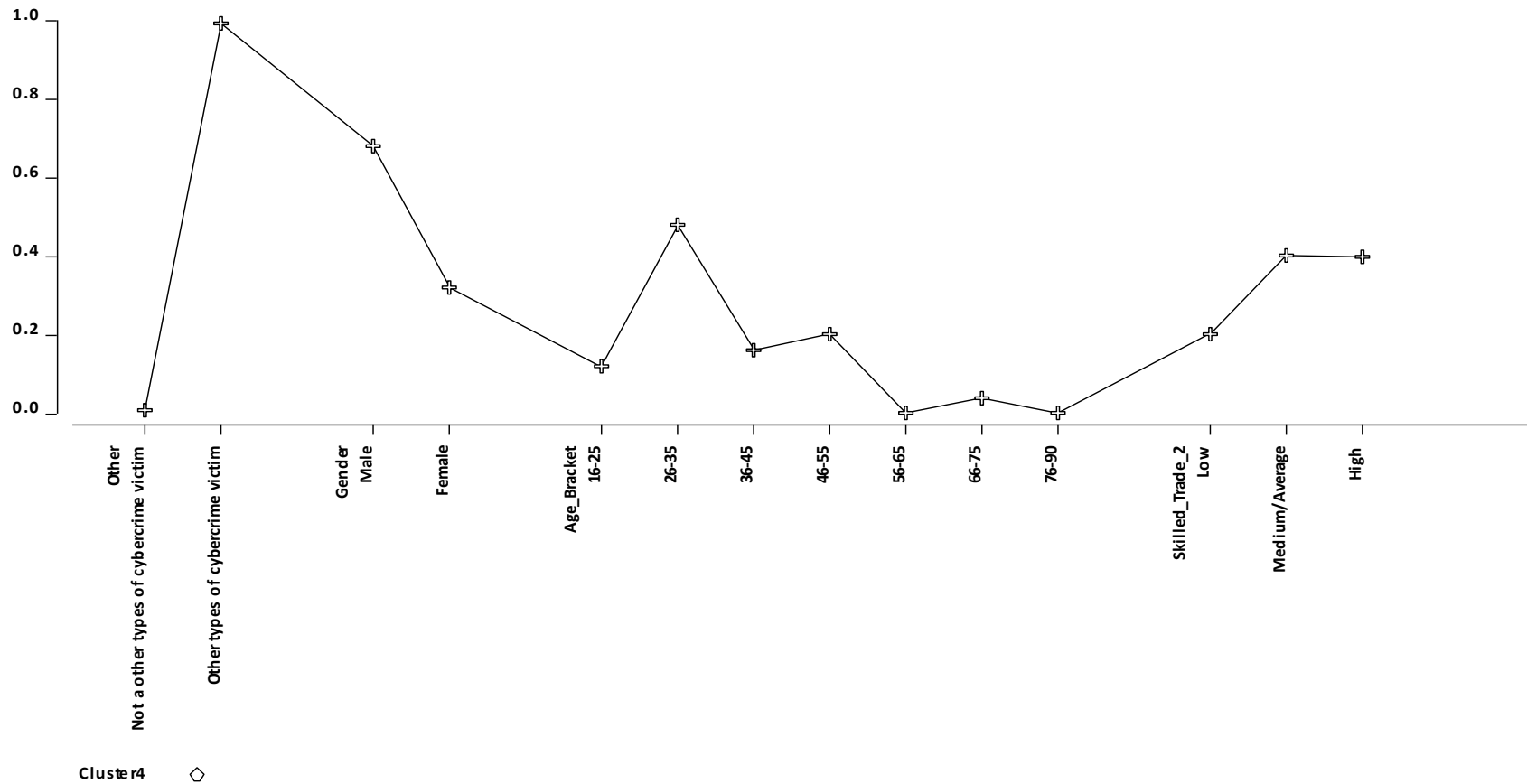
Figure 14 showing higher probability of 26-35 year male 'Other' types of cybercrime victims to belong to areas with higher number of skilled trade people than Lower number of lower number of skilled trade people

1.7 Cybercrime hotspot based on the number of victims

There are 3458 post code areas of cybercrime victims.

Table 3 number of post codes with number of victims

Number of victims	1 or 2 victims	3 or 4 victims	More than 4 victims
Number of post code areas	3358	91	9

Table 4 Number of post code areas in each district with more than 4 victims in a single post code

District	Number of post codes	Number of victims
Leeds	3	(7,6,5)
Bradford	2	(10,7)
Wakefield	3	(6,5,5)
Kirklees (Huddersfield)	1	5
Total post codes	9	

AGE profile of the post code areas with highest number of victims:

Majority of the victims are 16-25 years old.

Majority of the victims are female in these post code areas with highest number of victims.

Figure 15 Distribution of GENDER of the victims in hotspot cybercrime areas
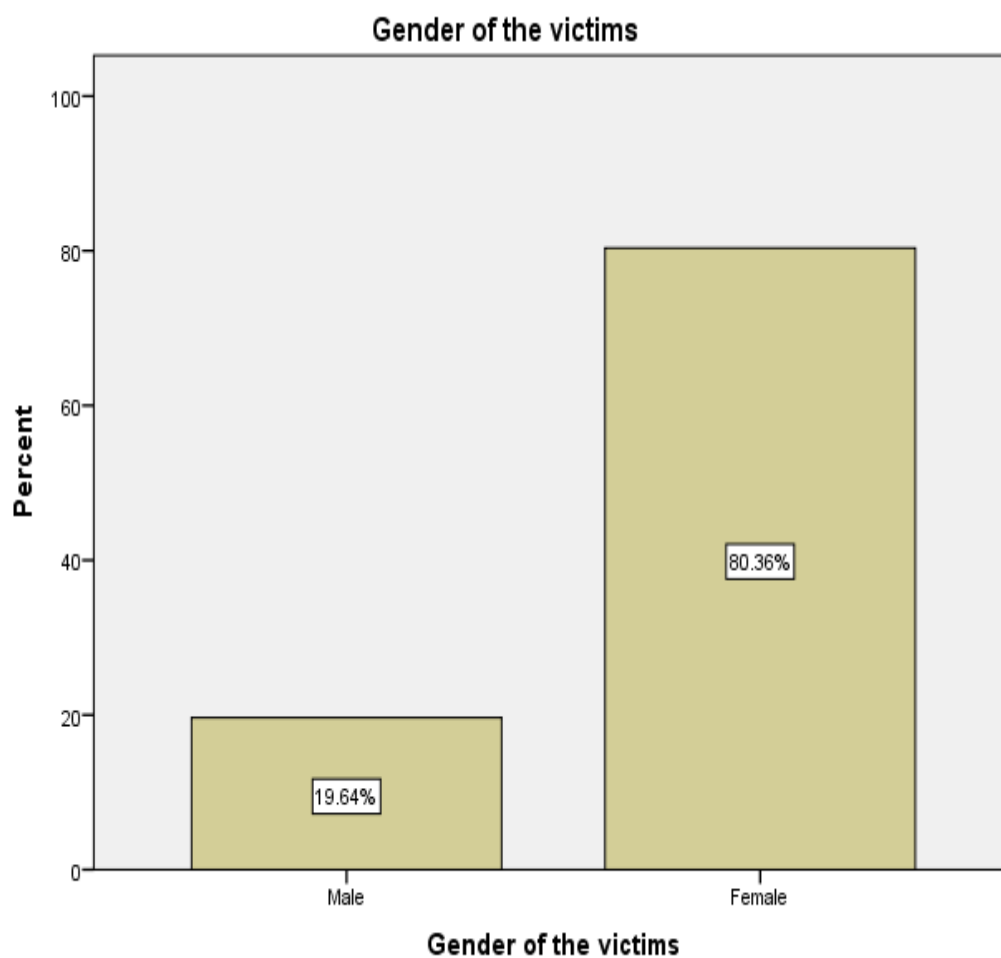

Area classification (Type of area):

More than half (53.57%) of the post code areas with higher number of victims are from ethnic areas (Young hard-pressed families, Hard-pressed ethnic mix, and multi-ethnic hardship). Nearly one third (26.79%) of the post code areas are from Ageing areas (Retired communal city dwellers and renting hard pressed workers).

Figure 16 Showing output area classification (2011 census) of areas for higher number of cybercrime victims (More than 4 victims from the same post-codes)

Type of post code areas with higher number of victims
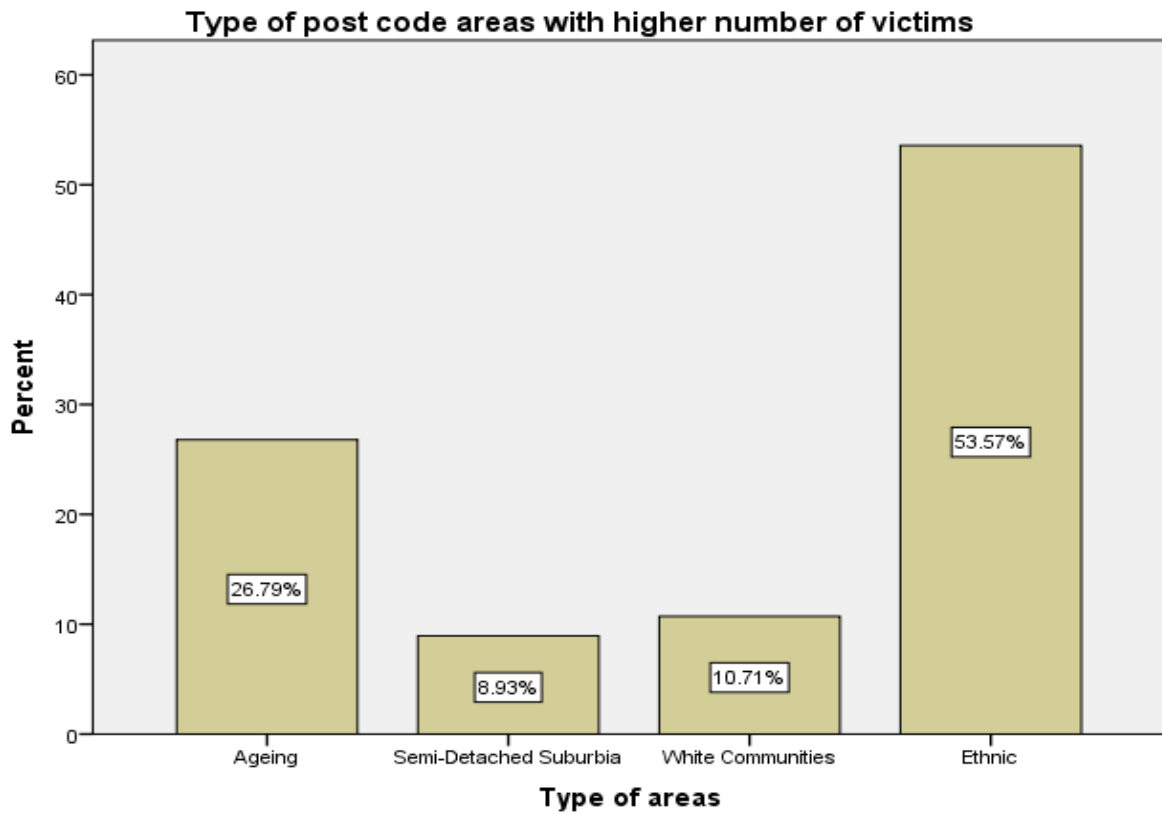
From the following table (Table 5) we can see that majority of the victims in ethnic and ageing areas are victimised to Harassment. None of the victims from Ageing, Semi-Detached suburbia and White communities are victimised to Fraud or sexual. In addition, there is no other type of cybercrime victims from any of the four different type of areas.

Table 5 Cross tabulation between four different cybercrime and output area classification

			Area Classification				
			Ageing	Semi-Detached Suburbia	White Communities	Ethnic	Total
Four different cybercrime	Harassment	Count	15	5	6	22	48
		% within Classification of four different cybercrime	31.3%	10.4%	12.5%	45.8%	100.0%
		% within Area Classification	100.0%	100.0%	100.0%	73.3%	85.7%
		% of Total	26.8%	8.9%	10.7%	39.3%	85.7%
	Fraud	Count	0	0	0	3	3
		% within Classification of four different cybercrime	0.0%	0.0%	0.0%	100.0%	100.0%
		% within Area Classification	0.0%	0.0%	0.0%	10.0%	5.4%
		% of Total	0.0%	0.0%	0.0%	5.4%	5.4%
	Sexual	Count	0	0	0	5	5
		% within Classification of four different cybercrime	0.0%	0.0%	0.0%	100.0%	100.0%
		% within Area Classification	0.0%	0.0%	0.0%	16.7%	8.9%
		% of Total	0.0%	0.0%	0.0%	8.9%	8.9%
Total		Count	15	5	6	30	56
		% within Classification of four different cybercrime	26.8%	8.9%	10.7%	53.6%	100.0%
		% within Area Classification	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	26.8%	8.9%	10.7%	53.6%	100.0%

More than half (54.5%) of the males are from Bradford and more than half (51.1%) females are from Leeds.

Table 6 Cross tabulation between GENDER of the victims and District of Victims

			District of Victims					
			Leeds	Bradford	Wakefield	Calderdale	Kirklees	Total
GENDER of the victims	Male	Count	0	6	0	2	3	11
		% within GENDER of the victims	0.0%	54.5%	0.0%	18.2%	27.3%	100.0%
		% within District of Victims	0.0%	35.3%	0.0%	40.0%	50.0%	19.6%
		% of Total	0.0%	10.7%	0.0%	3.6%	5.4%	19.6%
	Female	Count	23	11	5	3	3	45
		% within GENDER of the victims	51.1%	24.4%	11.1%	6.7%	6.7%	100.0%
		% within District of Victims	100.0%	64.7%	100.0%	60.0%	50.0%	80.4%
		% of Total	41.1%	19.6%	8.9%	5.4%	5.4%	80.4%
Total		Count	23	17	5	5	6	56
		% within GENDER of the victims	41.1%	30.4%	8.9%	8.9%	10.7%	100.0%
		% within District of Victims	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	41.1%	30.4%	8.9%	8.9%	10.7%	100.0%

We can see from the following table (Table 32) 72.7% male and 88.9% female are victimized to Harassment.

Table 7 Cross tabulation between GENDER of the victims and four different cybercrime

			Four different cybercrime			
			Harassment	Fraud	Sexual	Total
GENDER of the victims	Male	Count	8	2	1	11
		% within GENDER of the victims	72.7%	18.2%	9.1%	100.0%
		% within Classification of four different cybercrime	16.7%	66.7%	20.0%	19.6%
		% of Total	14.3%	3.6%	1.8%	19.6%
	Female	Count	40	1	4	45
		% within GENDER of the victims	88.9%	2.2%	8.9%	100.0%
		% within Classification of four different cybercrime	83.3%	33.3%	80.0%	80.4%
		% of Total	71.4%	1.8%	7.1%	80.4%
Total		Count	48	3	5	56
		% within GENDER of the victims	85.7%	5.4%	8.9%	100.0%
		% within Classification of four different cybercrime	100.0%	100.0%	100.0%	100.0%
		% of Total	85.7%	5.4%	8.9%	100.0%

1.8 Recommendations

Recommendation 1:

The total number of victims in the core dataset is 7364. However, cases with missing SEX or AGE have been excluded from the LC models. The total number of cases included in the LC models is 4092. Hence, we have only included only 55.56% cases from the core victim dataset. As reflexive researchers, the excluded individuals/victims from the dataset enable us to become aware of limiting generalisation of the findings from the analyses. It was disappointing that there were missing values of AGE and SEX of the victims in the WYP system. This is recommended to have a review of current practices at the data entry system for the reported cyber incidents within West Yorkshire Police (WYP).

Recommendation 2:

According to Chief Constable Olivia Pinkney, the National Police Chief's Council Portfolio Lead for the policing of Children and Young People, a core role for policing is to protect the vulnerable in society. WYP complies with the National Policing Children and Young Persons Strategy 2013-2016[1].It has been mentioned in the report that the 18-24 year age range is a key stage of development; the brain is still developing, independence is gained, socialising activity increases. The outputs from this research will add to the evidence base supporting the development of a holistic picture of the vulnerabilities of these younger cybercrime victims compounded with societal aspects such as different types of areas of these victims.

The channels between strategic and operational activities within WYP need to be explored for better utilisation of resources in combating cybercrime. It would perhaps be valuable to be aware of current WYP policies and operational directions on reducing vulnerabilities in respect of cybercrime victims including the mechanisms of channeling among multi agencies in the West Yorkshire in combating cybercrime at individual and area level. These latent class models have great potential to be embedded in evidence based policing practice, and could be adopted by other forces nationally and internationally. This is highly recommended to incorporate the informed benefit of using appropriate statistical tools to enhance the present capabilities of West Yorkshire Police and beyond.

Recommendation 3

A key potential area of future development arising from this research is to include Multi Level Modelling (MLM) in latent class analysis to pinpoint the factors both at individual and area level contributing to the differences in cybercrime victimization in five districts of West Yorkshire. The differences among the five districts will pave the way for local authorities to formulate better campaign programmes using limited resources to build purposeful cyber defence across the region. It is worth mentioning here that this idea of multilevel modelling has not been explored in the field of cybercrime before. However, with a good range of research done by well-known researchers in other areas such as education, health, epidemiology, we are confident that this potential idea can be formulated for future research and funding opportunities.

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[1] http://www.npcc.police.uk/documents/edhr/2015/CYP%20Strategy%202015_2017_August%202015.pdf

Recommendation 4

Another key area of research could be to build latent class profiles of cybercrime offenders. It has been discussed with the research members within CARI at Leeds Beckett University. A potential funding opportunity from the Police Knowledge Fund (round 2) will pave the way to build such profiles of offenders, which is an idea that has never been explored in the past either locally or nationally.