

Fluoroquinolone Toxicity Survey, Feb 2011: Visualization of Results

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Original survey at
<http://levaquinhurtme.weebly.com/my-story.html>

Note on Population Studied

- The population studied by the survey is:
 - comprised of people who joined an online support group* for fluoroquinolone (FQ) toxicity,
 - not a random sample, due to self-selection,
 - still useful to explore FQ toxicity patterns.
- There are 131 completed responses featured in this presentation of 137 total responses; six incomplete responses were excluded.
- Survey results related to demographics, symptomatology, and life impact were selected for enhanced presentation herein.
- *Support groups found at:
 - <http://health.groups.yahoo.com/group/fqtoxicity/>
 - <http://www.facebook.com/FluoroquinoloneToxicity>

Description of Survey*

Objective: The adverse reactions associated with fluoroquinolone antibiotics are devastating but, surprisingly under-recognized by patients as well as by medical professionals. This survey was conducted to identify the demographics of those who suffer from fluoroquinolone toxicity and to demonstrate the magnitude of physical symptoms as well as the impact of these symptoms on the individual as a whole.

Methods: 131 individuals who have identified themselves as having fluoroquinolone toxicity responded to an online survey. The respondents were blinded to previous survey answers during the questioning. Data was gathered and is presented below.

* Original author's content, available at:
<http://levaquinhurtme.weebly.com/my-story.html>

Interpretation of Data*

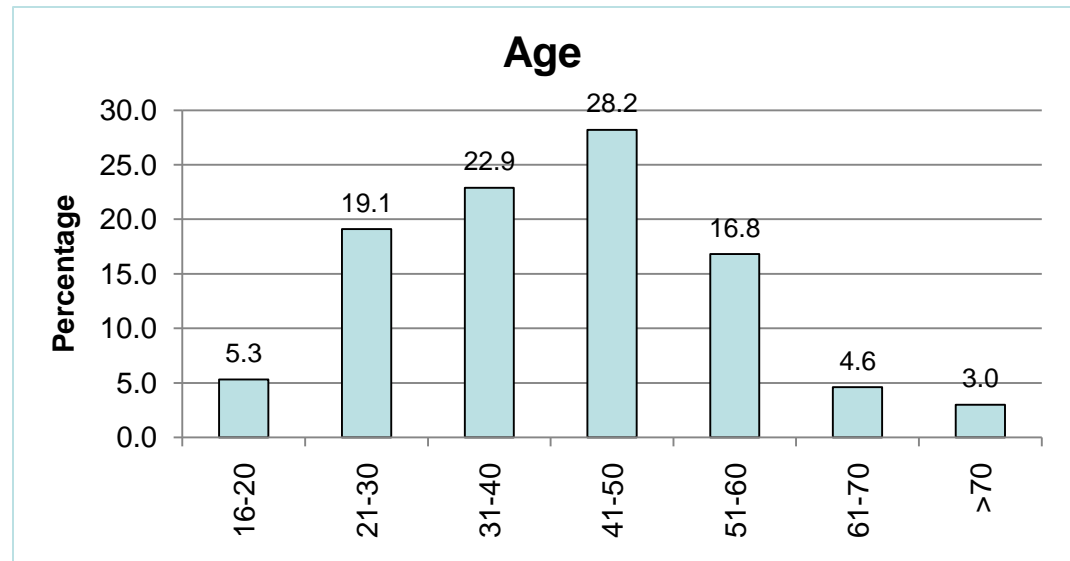
- Before looking at the following results, one must acknowledge some fundamental facts about the interpretation of data.
- This data was collected in the form of a survey. Inherently, surveys are open to multiple forms of bias.
 - The participants are answering both objective and subjective questions. While objective questions are relatively straightforward, subjective questions can be interpreted differently from one patient to another, and can also be answered with personal or emotional bias.
 - The selection of participants is another form of potential bias in this study. Because fluoroquinolone toxicity is a newly recognized syndrome, there are not yet any reliable diagnostic tests. There is also a paltry sum of aggregate data that is easily accessible to physicians. Therefore, many of the participants in this survey are self-diagnosed. While this is obviously not an ideal circumstance, to date, it is the only patient population available for study.
 - In addition to the lack of a verifiable diagnostic test, the participants may also not represent a realistic cross-section of individuals who suffer from fluoroquinolone toxicity. All participants had the knowledge and motivation to research the syndrome, find an online forum and participate in the survey. This process may have selected for a highly educated and computer savvy subpopulation.
- In spite of the abovementioned shortcomings of the available data, this information is a unique glimpse into the suffering of a very dedicated group of people. Their common interest in describing fluoroquinolone toxicity syndrome should serve as a springboard for further investigation into this devastating syndrome.

* Original author's content.

Demographics

Please enter your age when you were (affected by Fluoroquinolone Adverse Effects). [Enter your youngest age if (affected) more than once]

Age	Count (n=131)	Percent
16-20	7	5.3
21-30	25	19.1
31-40	30	22.9
41-50	37	28.2
51-60	22	16.8
61-70	6	4.6
>70	4	3.0
SUM	131	99.9



What is your gender?

Gender	Count (n=131)	Percent
Female	81	61.8
Male	50	38.2

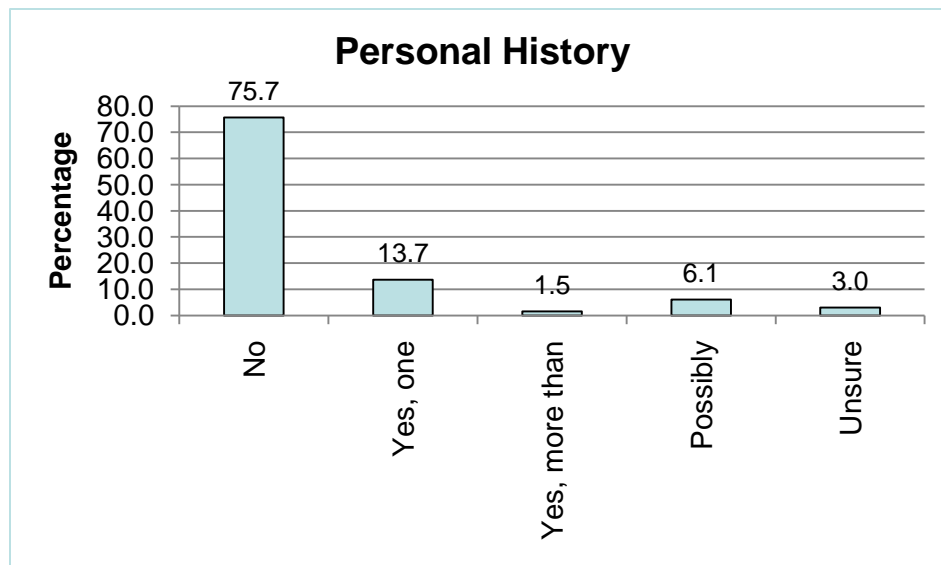
Observations:

- Previous studies have identified that users of internet health forums are predominantly female and below retirement age, though the Fluoroquinolone Factive (Gemifloxacin) is known to cause photosensitivity reactions at a higher rate in women.
- These figures are simply provided as a reference for interpretation of the data.

History of Autoimmune Diseases

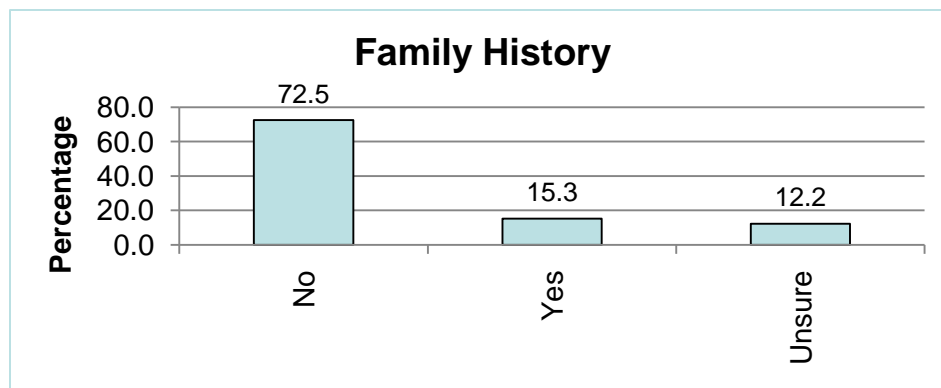
Did you have any autoimmune diseases before you took a FQ?

Personal History of Autoimmune Disease	Count (n=131)	Percent	95% CI
No	99	75.7	[68.2, 82.9]
Yes, one	18	13.7	NA
Yes, more than	2	1.5	NA
Possibly	8	6.1	NA
Unsure	4	3.0	NA
SUM	131	100.0	



Does anyone in your family have an autoimmune disease?

Family History	Count (n=131)	Percent	95% CI
No	95	72.5	[64.9, 80.2]
Yes	20	15.3	NA
Unsure	16	12.2	NA
SUM	131	100.0	



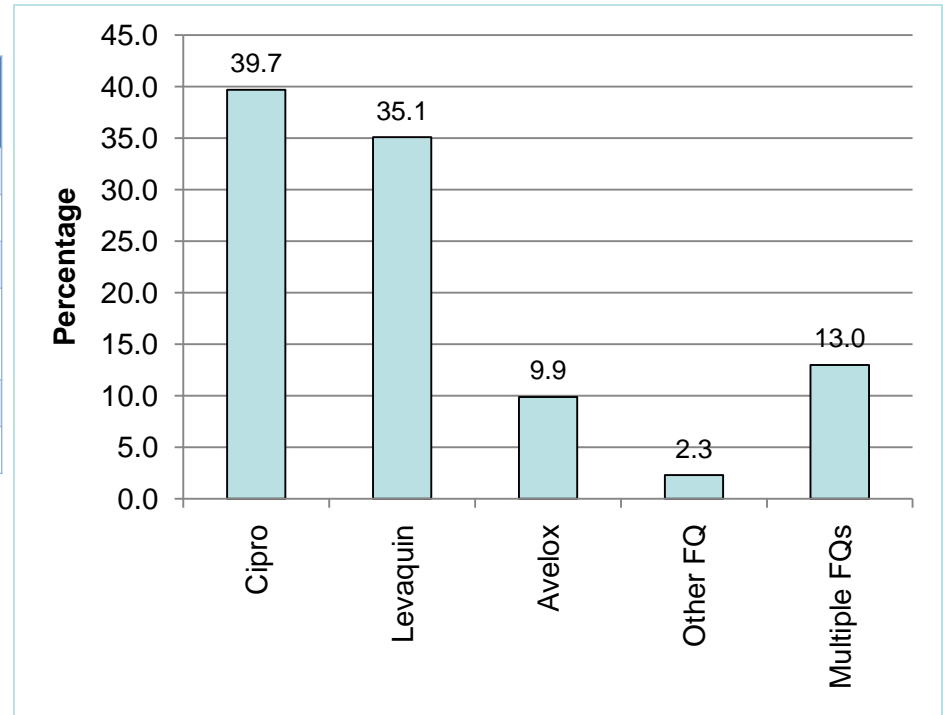
Observations:

- The vast majority (75.5%) of participants did not have any autoimmune disease before FQ exposure.
- Many fewer (13.7%) participants did have an autoimmune disease before FQ exposure.
- While most (72.5%) participants didn't have a family history of autoimmune diseases, some (15.3%) did (and some, 12.2%, were unsure).

Antibiotic Administered

Which antibiotic did you take?

Antibiotic Administered	Count (n=131)	Percent	95% CI
Ciprofloxacin (Cipro)	52	39.7	[31.3, 48.1]
Levofloxacin (Levaquin)	46	35.1	[26.9, 43.3]
Moxifloxacin (Avelox)	13	9.9	NA
Other FQs: (Ofloxacin , etc.)	3	2.3	NA
Multiple FQs	17	13.0	NA
SUM	131	100.0	



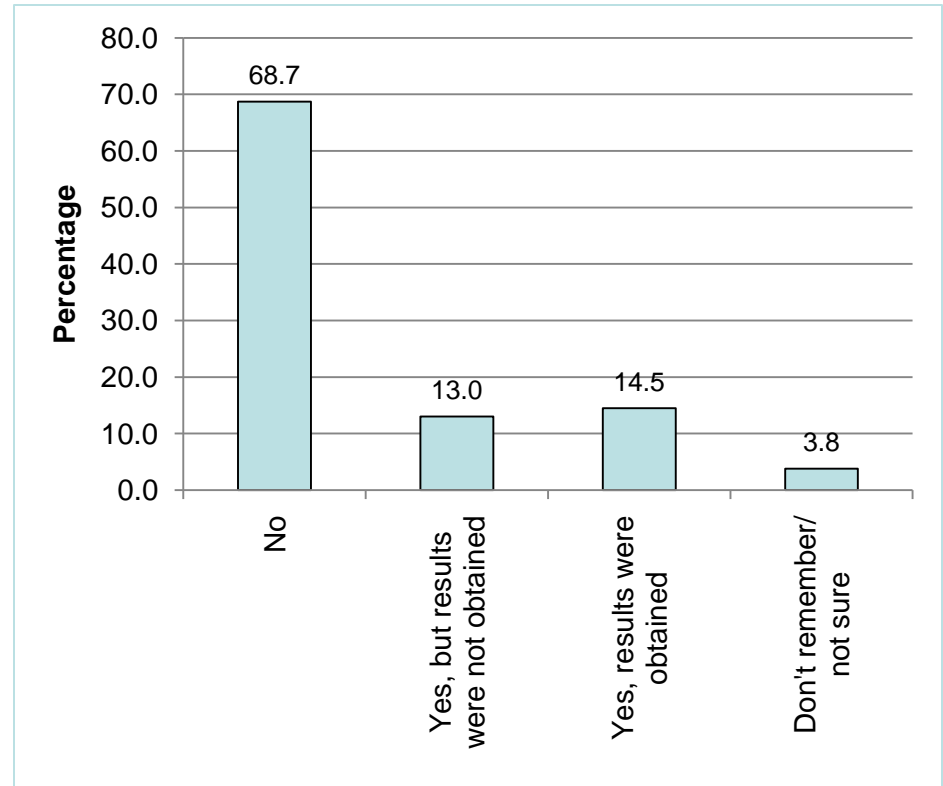
Observations:

- Cipro (39.7%) is slightly more common than Levaquin (35.1%) in the sample.
- Cipro and Levaquin together make up the majority (74.8%) of the sample.
- Avelox is less frequent (9.9%), and other FQs are much less common (2.3%) in the sample.
- A number of people took multiple FQs (13%).

Cultures

Were cultures of your infection site done to determine which antibiotic should be used?

Cultures Performed	Count (n=131)	Percent	95% CI
No	90	68.7	[60.8, 76.6]
Yes, but results were not obtained	17	13.0	NA
Yes, results were obtained	19	14.5	NA
Don't remember/ not sure	5	3.8	NA
SUM	131	100.0	



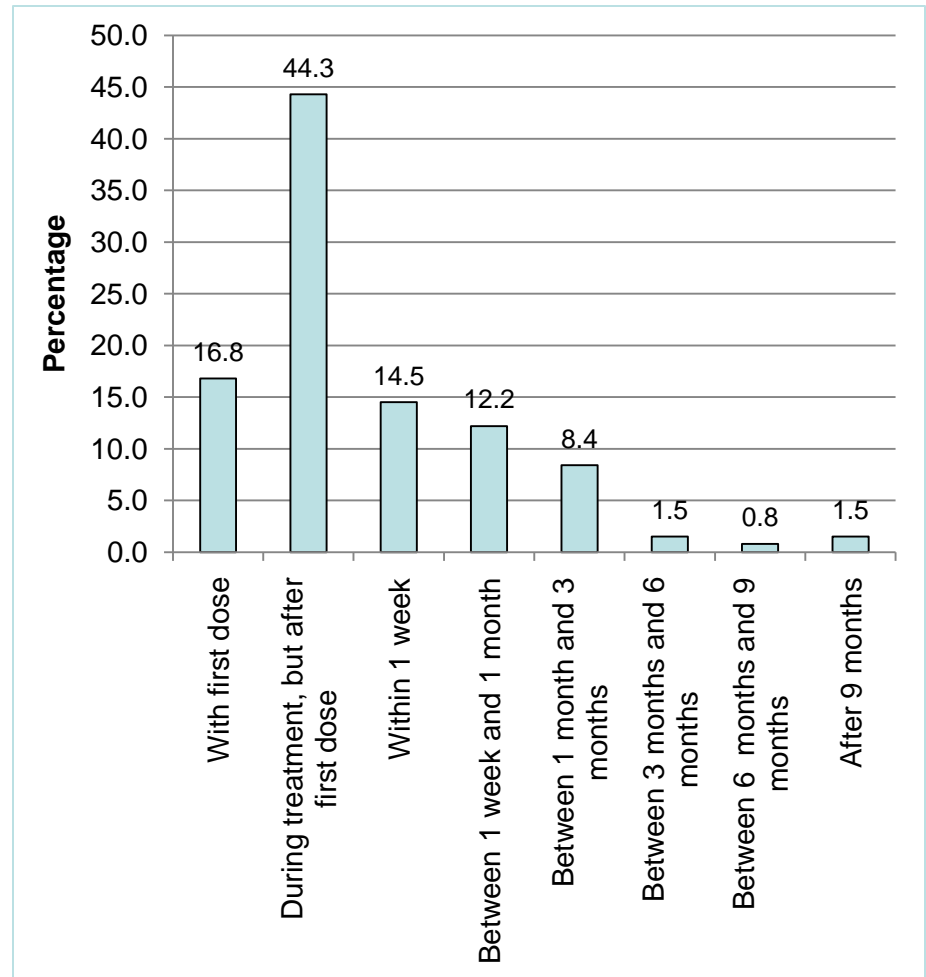
Observations:

- The majority (68.7%) of fluoroquinolone prescriptions were given without culturing for antibiotic susceptibility.
- Only 14.5% took the antibiotic with testing results obtained.

Timing of First Symptoms

When did your first symptoms of toxicity appear?

First Symptoms	Count (n=131)	Percent	95% CI
With first dose	22	16.8	NA
After first dose but during treatment course	58	44.3 [35.8, 52.8]	
Within 1 week after treatment	19	14.5	NA
Between 1 week and 1 month after treatment	16	12.2	NA
Between 1 month and 3 months after treatment	11	8.4	NA
Between 3 months and 6 months after treatment	2	1.5	NA
Between 6 months and 9 months after treatment	1	0.8	NA
After 9 months after treatment	2	1.5	NA
SUM	131	100.0	



Observations:

- 61.1% of participants had a reaction during treatment, while 38.9% had a reaction after.
- Previous studies have identified cases of symptoms occurring as late as six months after the fluoroquinolone exposure; 3 (2.3%) identified theirs as occurring later.

Symptoms

My symptoms include: (Check all that apply)

Symptom	Category	Count (n=131)	Percent	95% CI
Tendon pain	Mus.	113	86.2	NA
Joint pain	Mus.	111	84.7	NA
Muscle pain	Mus.	103	78.6	[71.6, 85.6]
Fatigue	Mult.	99	75.6	[68.2, 82.9]
Popping/cracking joints	Mus.	95	72.5	[64.9, 80.2]
Weakness	Mult.	94	71.8	[64.0, 79.5]
Neuropathic pain	PNS	83	63.4	[55.1, 71.6]
Paresthesias (Tingling)	PNS	81	61.8	[53.5, 70.2]
Muscle Twitching	PNS	78	59.5	[51.1, 67.9]
Depression	CNS	75	57.2	[48.8, 65.7]
Anxiety	CNS	75	57.2	[48.8, 65.7]
Insomnia	CNS	73	55.7	[47.2, 64.2]
Back pain	Mus.	69	52.7	[44.1, 61.2]
Memory loss	CNS	68	51.9	[43.3, 60.5]
Tinnitus	A.,V.,O.	61	46.6	[38.0, 55.1]
Muscle wasting	Mult.	60	45.8	[37.3, 54.3]

Symptom	Category	Count (n=131)	Percent	95% CI
Headaches	CNS	56	42.7	[34.3, 51.2]
Dry eyes	Endoc.	52	39.7	[31.3, 48.1]
Vision loss	A.,V.,O.	51	38.9	[30.6, 47.3]
Thoughts of suicide	CNS	45	34.4	[26.2, 42.5]
Hair loss	Endoc.	42	32.1	[24.1, 40.0]
Abnormal heart rhythm	Cardio.	41	31.3	[23.4, 39.2]
New dental problems	Mus.	41	31.3	[23.3, 39.3]
Weight loss	Mult.	41	31.3	[23.3, 39.2]
New thyroid abnormalities	Endoc.	25	19.1	NA
Hearing loss	A.,V.,O.	22	16.8	NA
Diplopia (Double vision)	A.,V.,O.	18	13.7	NA
New endocrine abnormality other than thyroid	Endoc.	17	13.0	NA
Tendon rupture	Mus.	16	12.2	NA
Seizures	CNS	7	5.3	NA
Retinal tears	A.,V.,O.	5	3.8	NA
Other	Mult.	44	33.6	[25.5, 41.7]

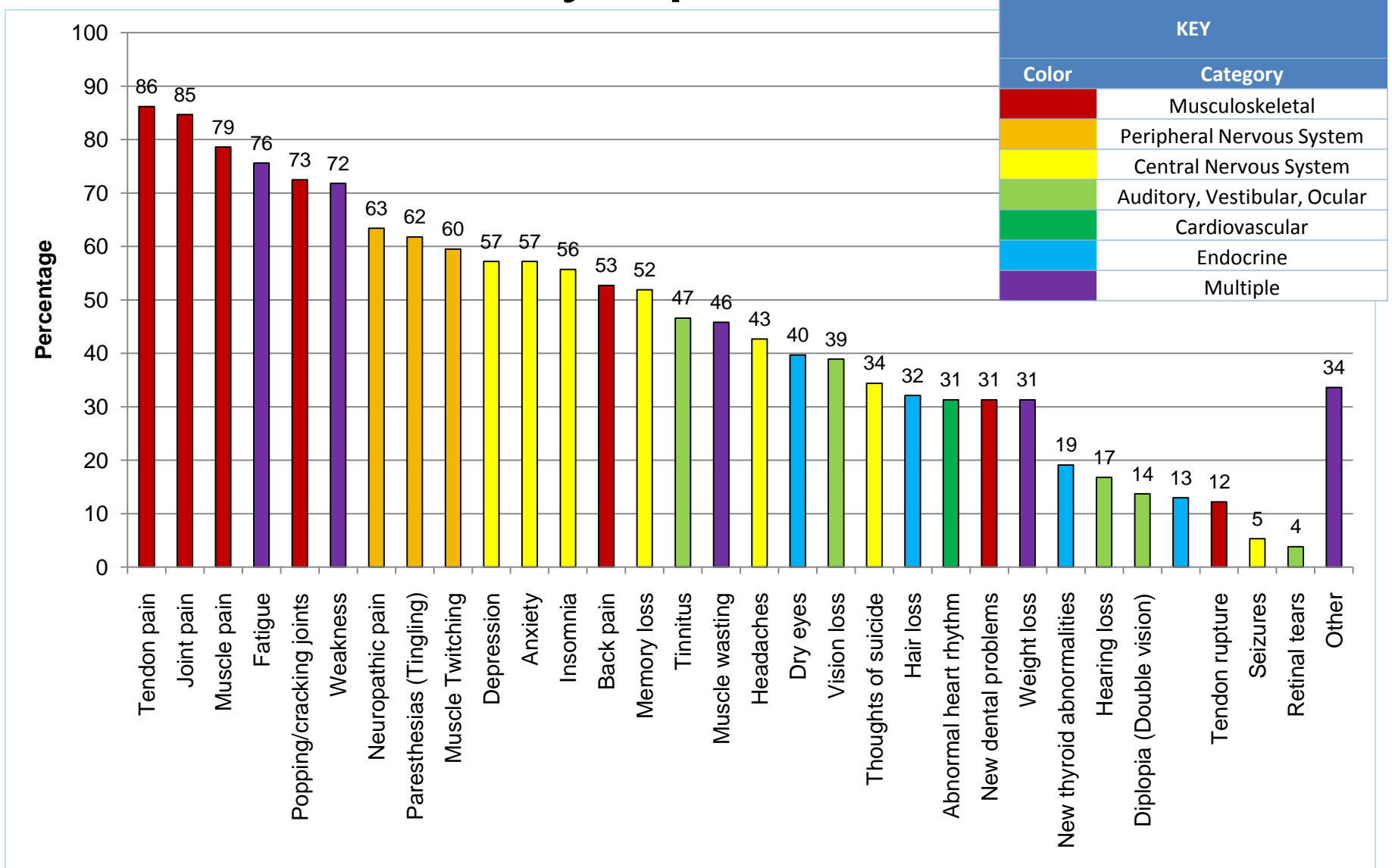
Abbreviations:

• **Mus.** = Musculoskeletal; **A.,V.,O.** = Auditory, Vestibular, Ocular; **Endoc.** = Endocrine; **Mult.** = multiple.

Observations:

- Tendon pain, joint pain, muscle pain, and fatigue are found in more than 75% of all participants.
- Excluding the “Other” category, there are 13.9 symptoms per individual on average; the median is 14, quartiles (9, 18), and maximum 26.

Symptoms



Worst Symptom

***The symptom that causes me the most pain and/or disability is:
(Choose one)***

Symptom	Category	Count (n=86)	Percent
Tendon pain	Mus.	25	29.1
Neuropathic pain	PNS	12	14.0
Joint pain	Mus.	10	11.7
Anxiety	CNS	7	8.1
Muscle pain	Mus.	4	4.6
Insomnia	CNS	3	3.5
Tendon rupture	Mus.	3	3.5
Fatigue	Mult.	2	2.3
Muscle wasting	Mult.	2	2.3
New thyroid abnormalities	Endoc.	2	2.3
Tinnitus	A.,V.,O.	2	2.3
Weakness	Mult.	2	2.3
Diplopia (Double vision)	A.,V.,O.	1	1.2
Dry eyes	Endoc.	1	1.2
Headaches	CNS	1	1.2
New endocrine abnormality (non-thyroid)	Endoc.	1	1.2

Abbreviations:

- **Mus.** = Musculoskeletal; **A.,V.,O.** = Auditory, Vestibular, Ocular; **Endoc.** = Endocrine; **Mult.** = multiple.

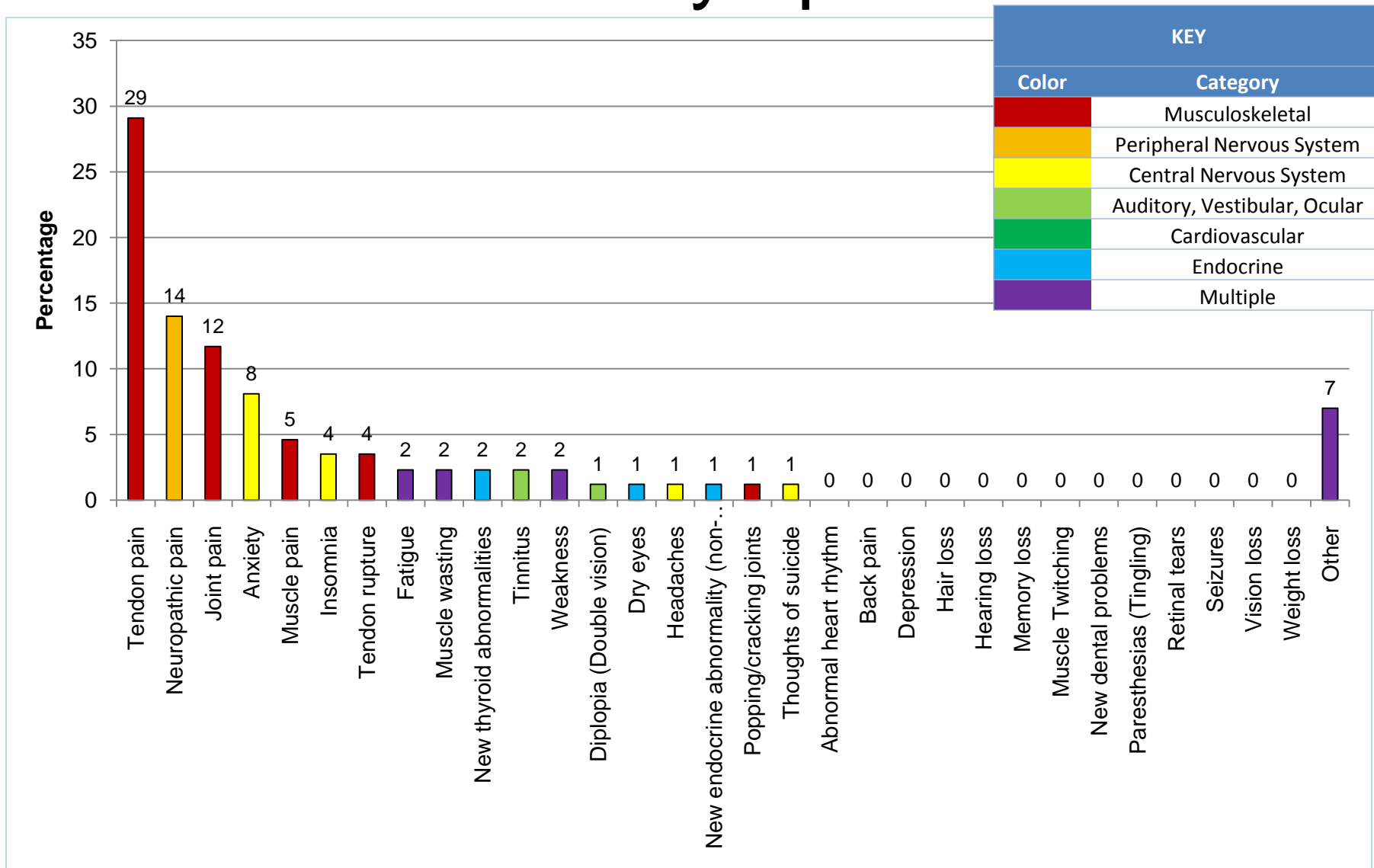
* 45 answers were excluded from this table for having more than one marked response.

Observation:

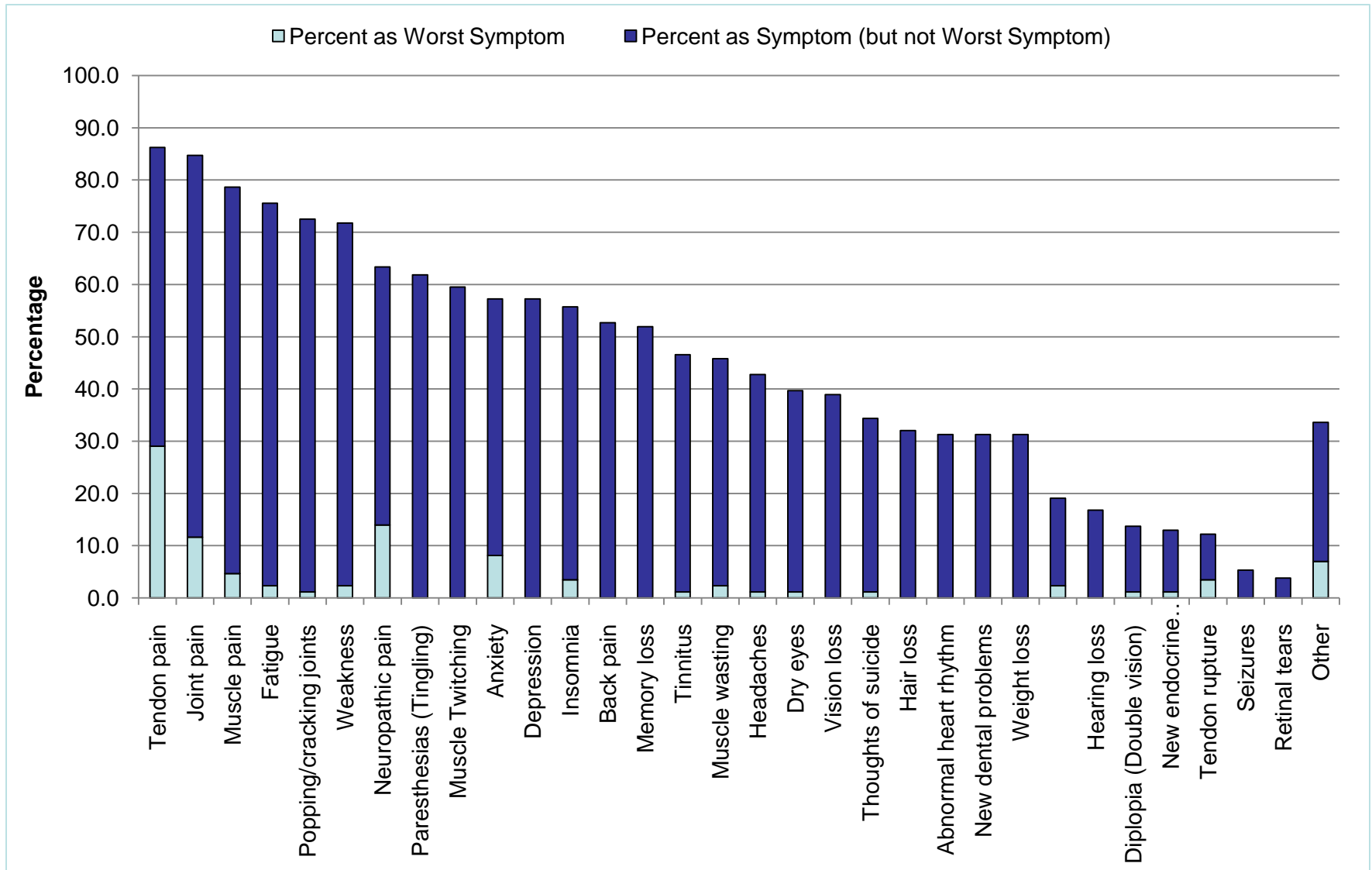
- Tendon, neuropathic, and joint pain comprise over half of the most troubling symptoms for sample subjects (note only a subset of responses used*).

Symptom	Category	Count (n=86)	Percent
Popping/cracking joints	Mus.	1	1.2
Thoughts of suicide	CNS	1	1.2
Abnormal heart rhythm	Cardio.	-	-
Back pain	Mus.	-	-
Depression	CNS	-	-
Hair loss	Endoc.	-	-
Hearing loss	A.,V.,O.	-	-
Memory loss	CNS	-	-
Muscle Twitching	PNS	-	-
New dental problems	Mus.	-	-
Paresthesias (Tingling)	PNS	-	-
Retinal tears	A.,V.,O.	-	-
Seizures	CNS	-	-
Vision loss	A.,V.,O.	-	-
Weight loss	Mult.	-	-
Other	Mult.	6	7.0
SUM		86	100.2

Worst Symptom



Symptom Proportion



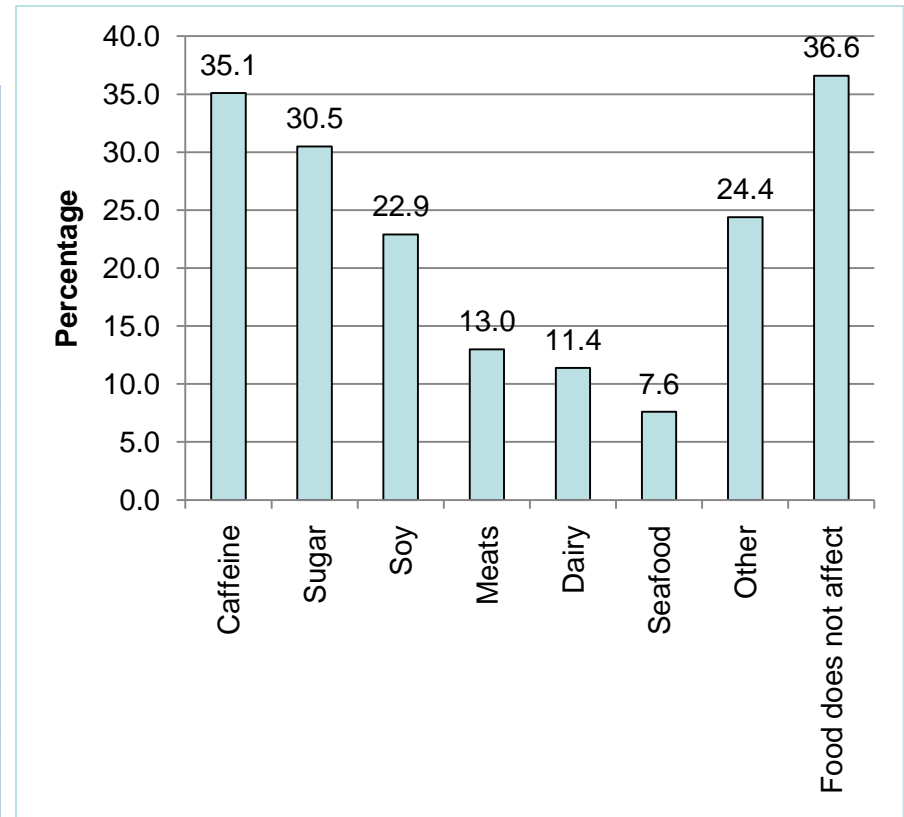
Symptoms Related to Foods

Please check all that apply regarding foods and your symptoms.

Symptoms/Food	Count (n=131)	Percent	95% CI
I do not tolerate caffeine.	46	35.1	[26.9, 43.3]
My symptoms are worse with sugar.	40	30.5	[22.6, 38.4]
My symptoms are worse with soy.	30	22.9	[15.7, 30.1]
My symptoms are worse with meats.	17	13.0	NA
My symptoms are worse with dairy.	15	11.4	NA
My symptoms are worse with seafood.	10	7.6	NA
Other	32	24.4	[17.1, 31.8]
Food does not seem to affect my symptoms.	48	36.6	[28.4, 44.9]

Observations:

- About a third (36.6%) of subjects do not notice any correlation between symptom severity and foods.
- All participants marked an answer, and those who marked “does not seem to affect” marked only that.

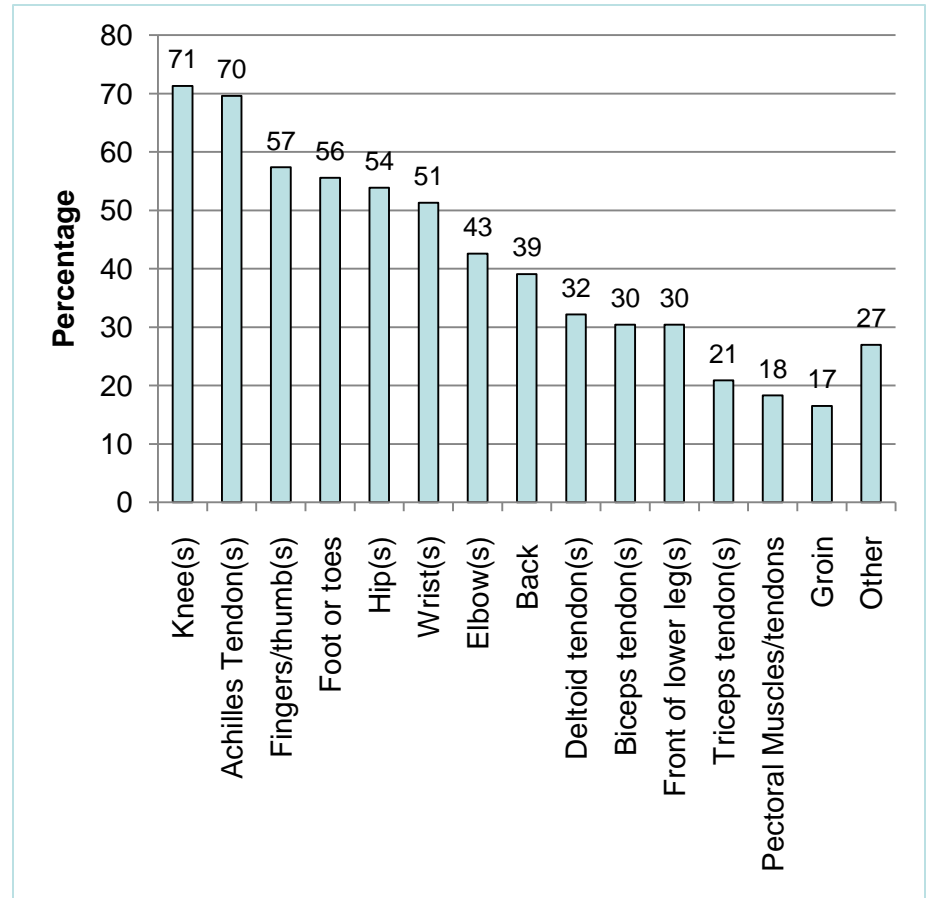


- Among the foods listed, caffeine, sugar, and soy were most commonly associated with exacerbated symptoms.
- Nearly a quarter of the participants note associations with “Other” foods and FQ toxicity symptoms.

Sites of Tendon Pain

Please answer ONLY if you have tendon pain/ tendinitis. Where do you have pain? (Check all that apply)

Tendon Pain	Count (n=115)	Percent	95% CI
Knee(s)	82	71.3	[63.0, 80.0]
Achilles Tendon(s)	80	69.6	[61.2, 78.0]
Fingers/thumb(s)	66	57.4	[48.4, 66.4]
Foot or toes	64	55.6	[46.6, 64.7]
Hip(s)	62	53.9	[44.8, 63.0]
Wrist(s)	59	51.3	[42.2, 60.4]
Elbow(s)	49	42.6	[33.6, 51.6]
Back	45	39.1	[30.2, 48.0]
Deltoid tendon(s)	37	32.2	[23.6, 40.7]
Biceps tendon(s)	35	30.4	[22.0, 38.8]
Front of lower leg(s)	35	30.4	[22.0, 38.8]
Triceps tendon(s)	24	20.9	[13.4, 28.3]
Pectoral Muscles/tendons	21	18.3	NA
Groin	19	16.5	NA
Other	31	27.0	[18.8, 35.0]



Observations:

- The most common sites reported for tendon pain were the Knees and Achilles tendons.
- Tendon pain was regularly reported in both upper and lower extremities.

- The average number of tendon pain locations is 5.9 per participant, excluding “Other”; the median is 5, quartiles (3, 8), and maximum 14.

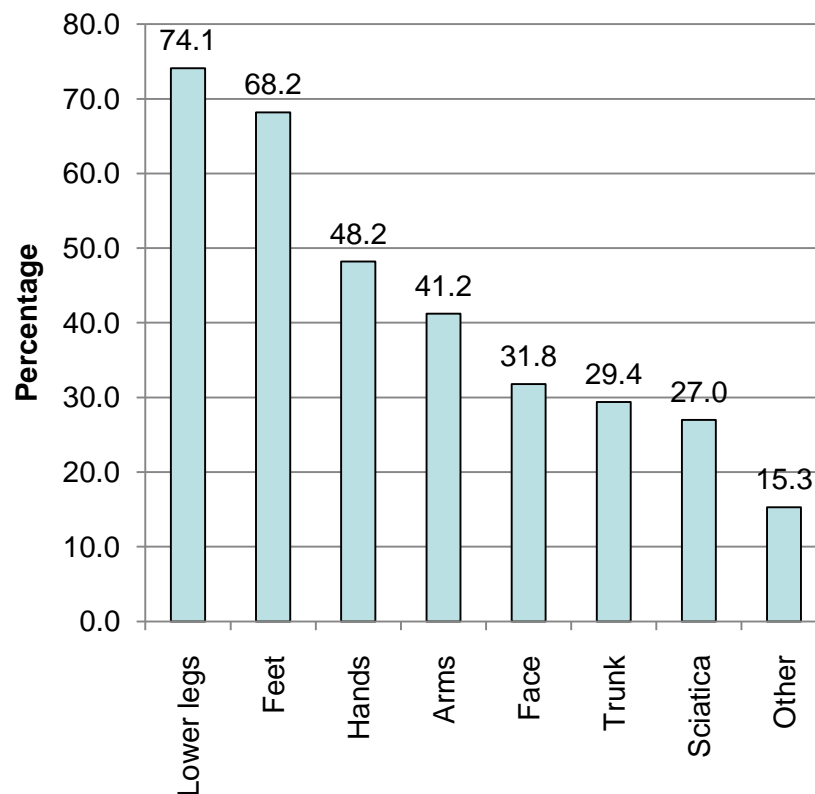
Sites of Nerve Pain

Please answer ONLY if you have neuropathic pain. Where is your pain? (Check all that apply)

Neuropathic Pain	Count (n=85)	Percent	95% CI
Lower legs	63	74.1	[64.8, 83.4]
Feet	58	68.2	[58.3, 78.1]
Hands	41	48.2	[37.6, 58.8]
Arms	35	41.2	[30.7, 51.6]
Face	27	31.8	[21.9, 41.7]
Trunk	25	29.4	[19.7, 39.1]
Sciatica	23	27.0	NA
Other	13	15.3	NA

Observations:

- Nerve pain is more common in the lower legs and feet of survey participants.
- The average number of nerve pain locations is 3.2 per participant, excluding “Other”; the median is 3, quartiles (2, 4), and maximum 7.



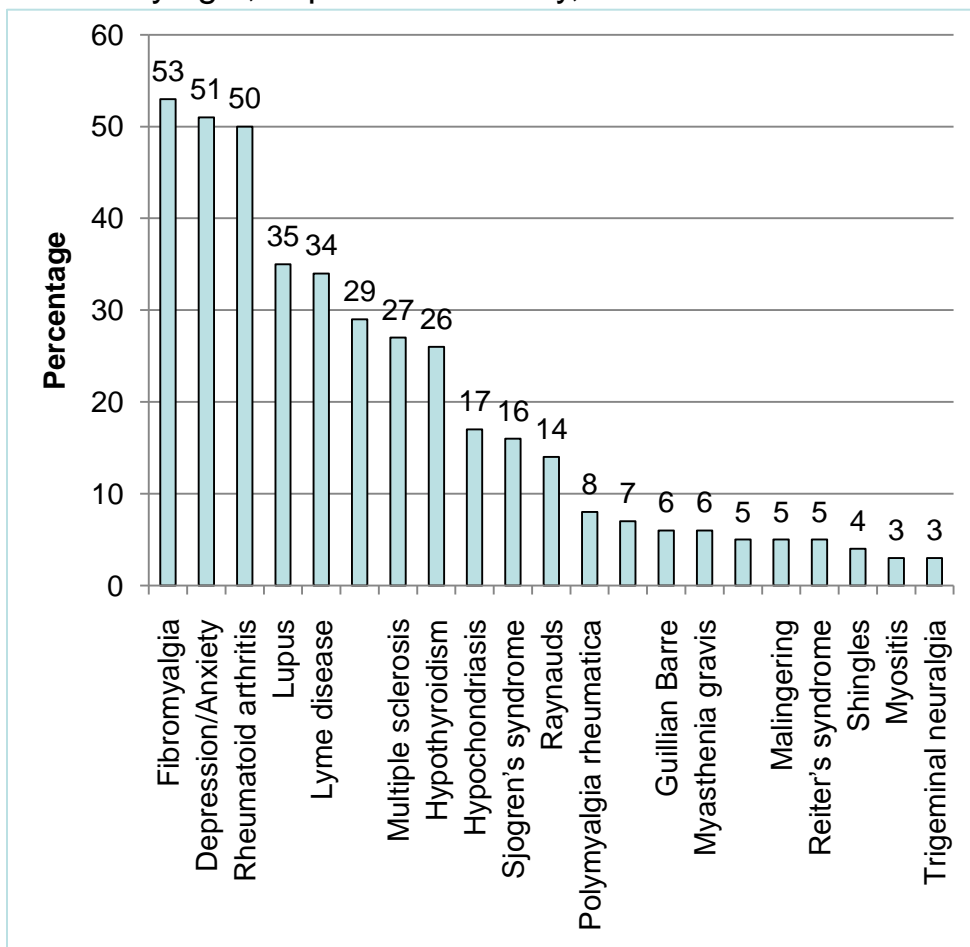
Alternative Diagnosis Considered

Which of the following diagnoses have been considered during your workup? (Check all that apply)

Diagnosis Considered	Count (n= 131)	Percent
Fibromyalgia	70	53
Depression/Anxiety	67	51
Rheumatoid arthritis	66	50
Lupus	46	35
Lyme disease	45	34
Chronic fatigue syndrome	38	29
Multiple sclerosis	35	27
Hypothyroidism	34	26
Hypochondriasis	22	17
Sjogren's syndrome	21	16
Raynauds	18	14
Polymyalgia rheumatica	10	8
Reflex sympathetic dystrophy (RSD)	9	7
Guillian Barre	8	6
Myasthenia gravis	8	6
Amyotrophic lateral sclerosis (ALS)	7	5
Malingering	7	5
Reiter's syndrome	7	5
Shingles	6	4
Myositis	4	3
Trigeminal neuralgia	4	3
Other	54	41

Observations:

- On average, more than 4 other diagnoses were considered per participant.
- The most common alternative diagnoses are: fibromyalgia, depression/anxiety, and rheumatoid arthritis.



Helpful Treatments

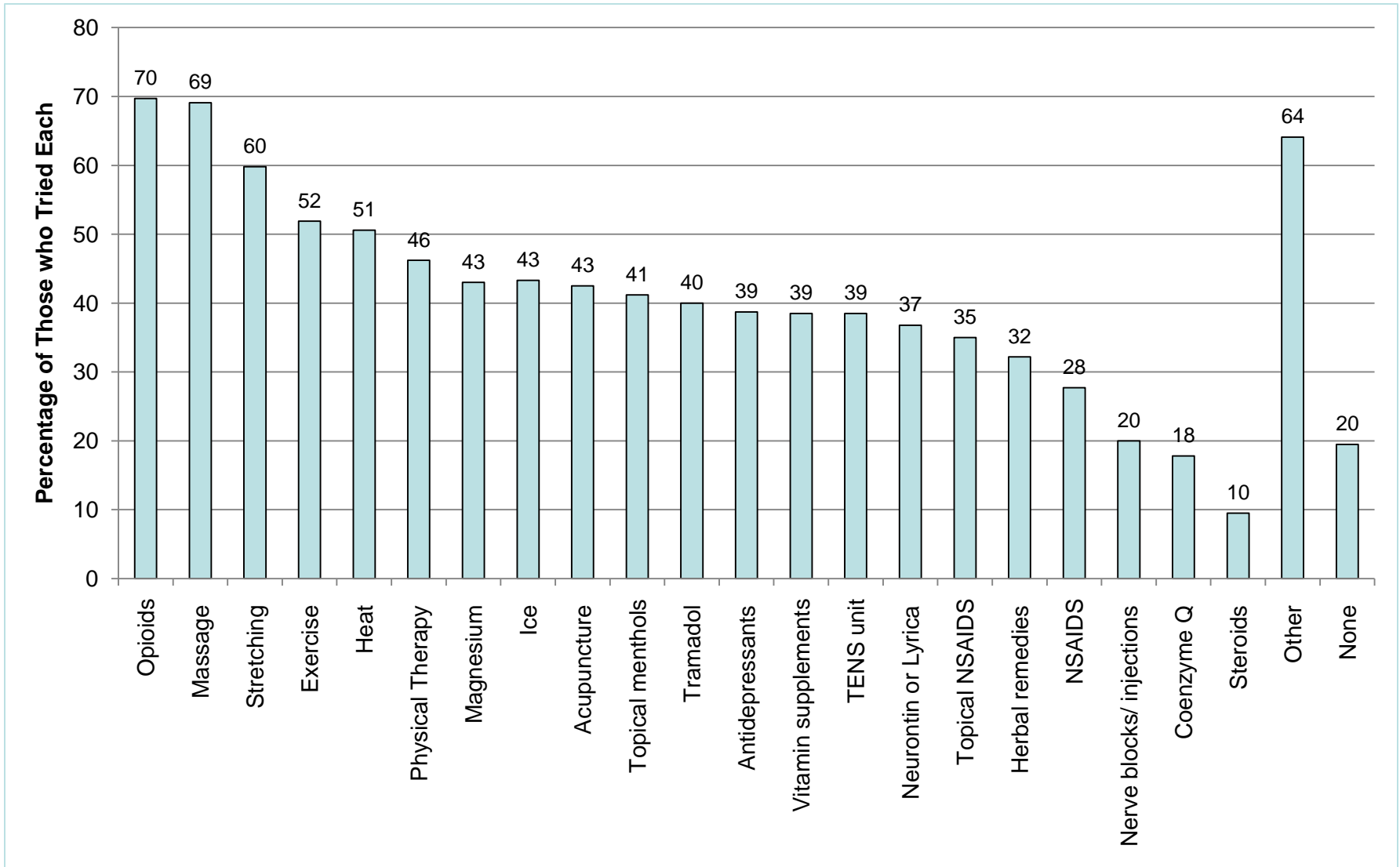
***Which treatments have helped you AT ALL?
(Check all that apply)***

Treatment	Count Found Helpful	Number Who Tried (n)	Percent	95% CI
Opioids	23	33	69.7	NA
Massage	38	55	69.1	[56.9, 81.3]
Stretching	49	82	59.8	[49.1, 70.4]
Exercise	40	77	51.9	[40.8, 63.1]
Heat	39	77	50.6	[39.5, 61.8]
Physical Therapy	24	52	46.2	[32.6, 59.7]
Magnesium	37	86	43.0	[32.6, 53.5]
Ice	29	67	43.3	[31.4, 55.1]
Acupuncture	17	40	42.5	[27.2, 57.8]
Topical menthols	14	34	41.2	[24.6, 57.7]
Tramadol	10	25	40.0	[20.8, 59.2]
Antidepressants	12	31	38.7	[21.6, 55.8]
Vitamin supplements	37	96	38.5	[28.8, 48.3]
TENS unit	10	26	38.5	[19.8, 57.2]
Neurontin or Lyrica	7	19	36.8	[15.2, 58.5]
Topical NSAIDS	7	20	35.0	NA
Herbal remedies	19	59	32.2	[20.3, 44.1]
NSAIDS	18	65	27.7	[16.8, 38.6]
Nerve blocks/ injections	1	5	20.0	NA
Coenzyme Q	8	45	17.8	NA
Steroids	2	21	9.5	NA
Other	25	39	64.1	NA
None	25	128	19.5	[12.7, 26.4]

Observations:

- The five most commonly helpful treatments were opioids, massage, stretching, exercise, and heat.
- Almost 20% of participants found no helpful treatments.

Helpful Treatments



Most Helpful Treatment

Which single treatment helped you the MOST? (Please check one)

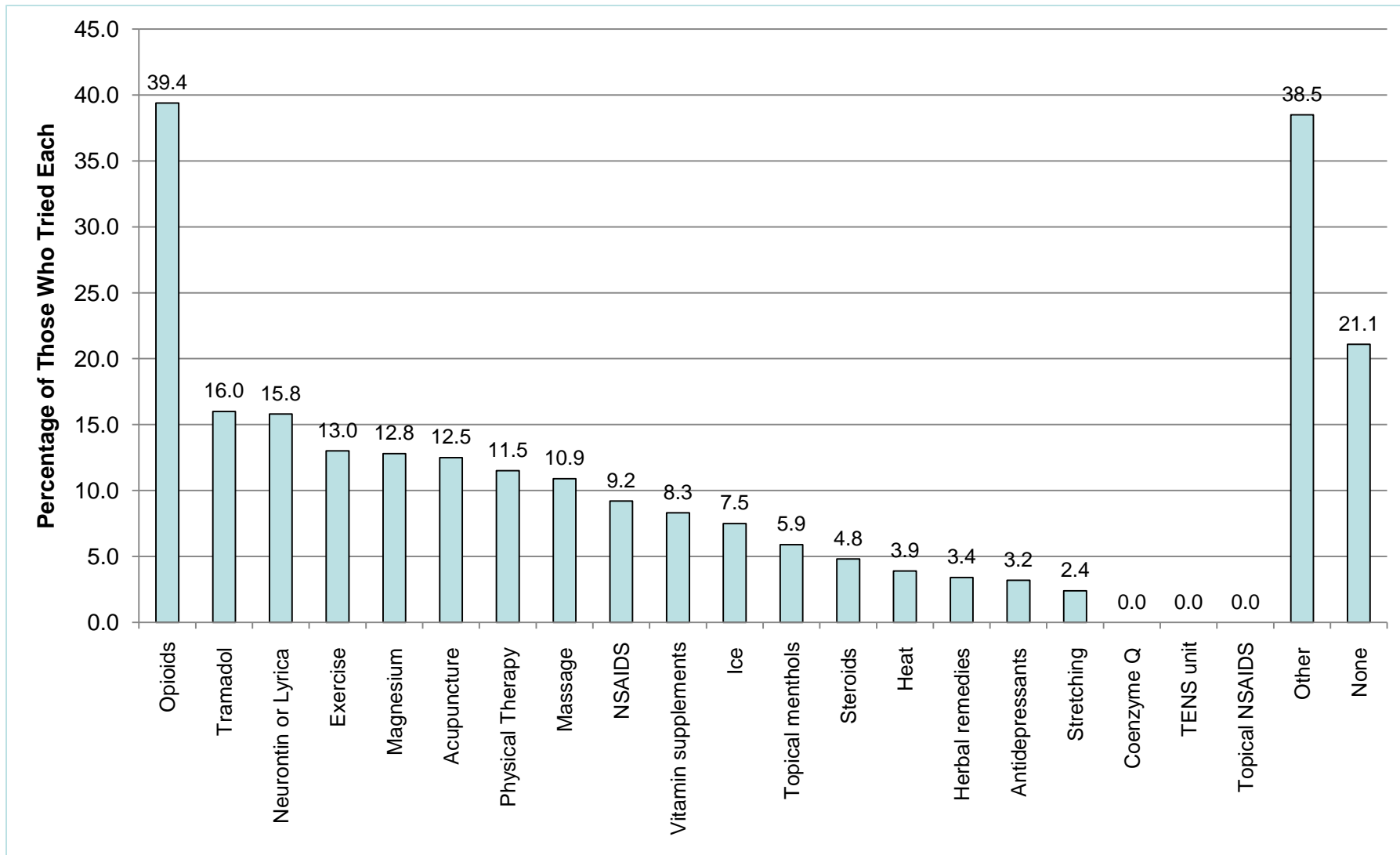
Treatment	Count Found Most Helpful	Number who tried	Percent	95% CI
Opioids	13	33	39.4	[22.7, 56.1]
Nerve blocks/ injections	1	5	20.0	NA
Tramadol	4	25	16.0	NA
Neurontin or Lyrica	3	19	15.8	NA
Exercise	10	77	13.0	NA
Magnesium	11	86	12.8	NA
Acupuncture	5	40	12.5	NA
Physical Therapy	6	52	11.5	NA
Massage	6	55	10.9	NA
NSAIDS	6	65	9.2	NA
Vitamin supplements	8	96	8.3	NA
Ice	5	67	7.5	NA
Topical menthols	2	34	5.9	NA
Steroids	1	21	4.8	NA
Heat	3	77	3.9	NA
Herbal remedies	2	59	3.4	NA
Antidepressants	1	31	3.2	NA
Stretching	2	82	2.4	NA
Coenzyme Q	0	45	0.0	NA
TENS unit	0	26	0.0	NA
Topical NSAIDS	0	20	0.0	NA
Other	15	39	38.5	NA
None	27	128	21.1	NA
SUM	131			

Observations:

- Almost 40% of sample subjects found opioids to be the most helpful treatment.
- In total Exercise, Magnesium, Acupuncture, Physical Therapy, and Massage were found to be the most helpful treatments by 60.7%.
- Follow up with several respondents indicated topical magnesium solutions are sometimes used for pain relief.

Most Helpful Treatment

Most helpful treatment, where number who tried $n \geq 15$.



Treatments that Worsened Symptoms

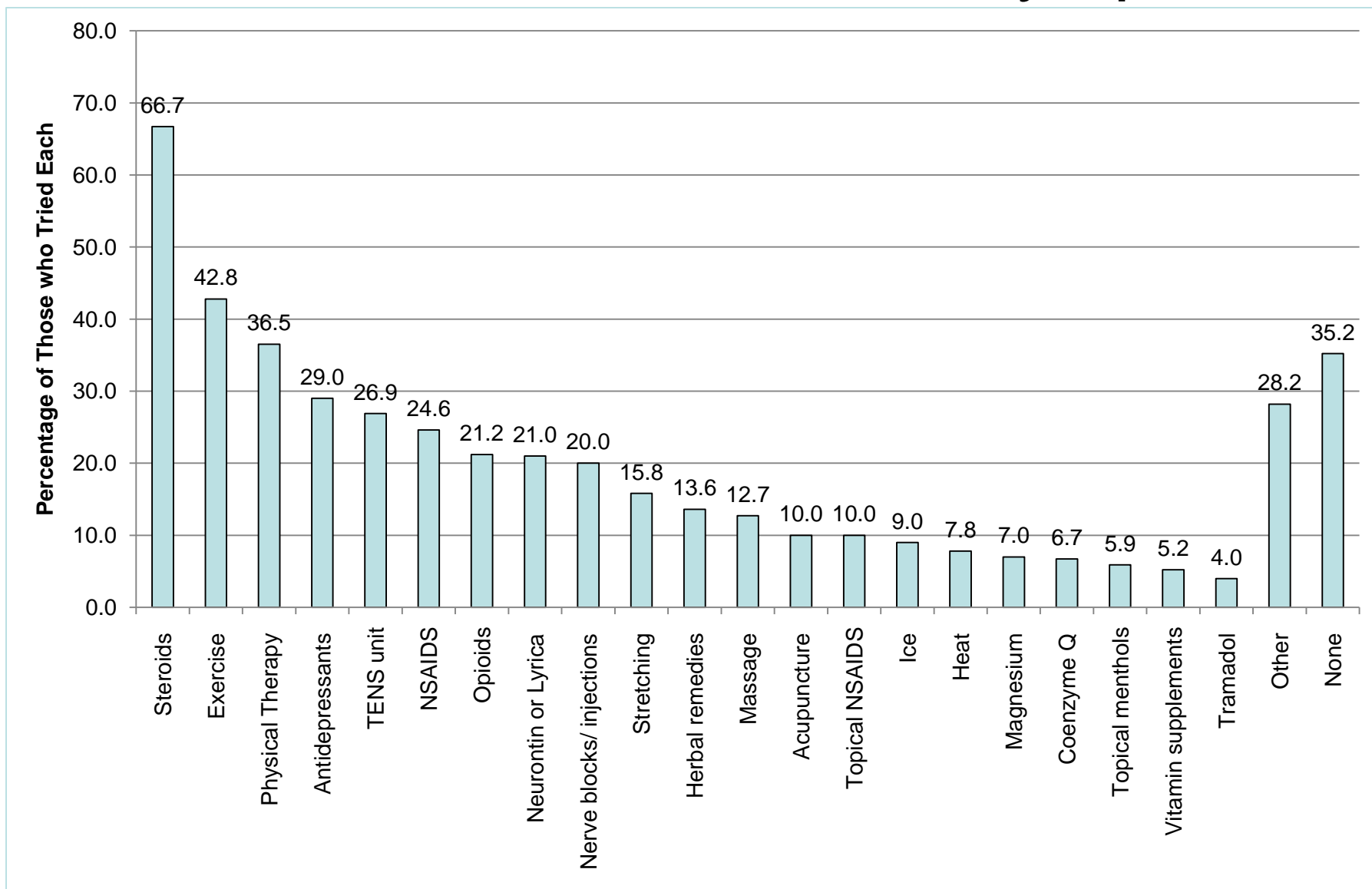
Which treatments made symptoms WORSE? (Choose all that apply)

Observations (for those who tried the treatments):

- Approximately two-thirds of sample subjects found that steroids made symptoms worse.
- Antidepressants, NSAIDs, worsened symptoms for 29%,24.6% of respondents, respectively. Feedback indicated some antidepressants work better than others, and doses must be started very low.
- In follow up comments from respondents, exercise can worsen symptoms when started too soon or too hard, but be helpful when done within limits, progressively, hence its appearance as both helpful and worsening.

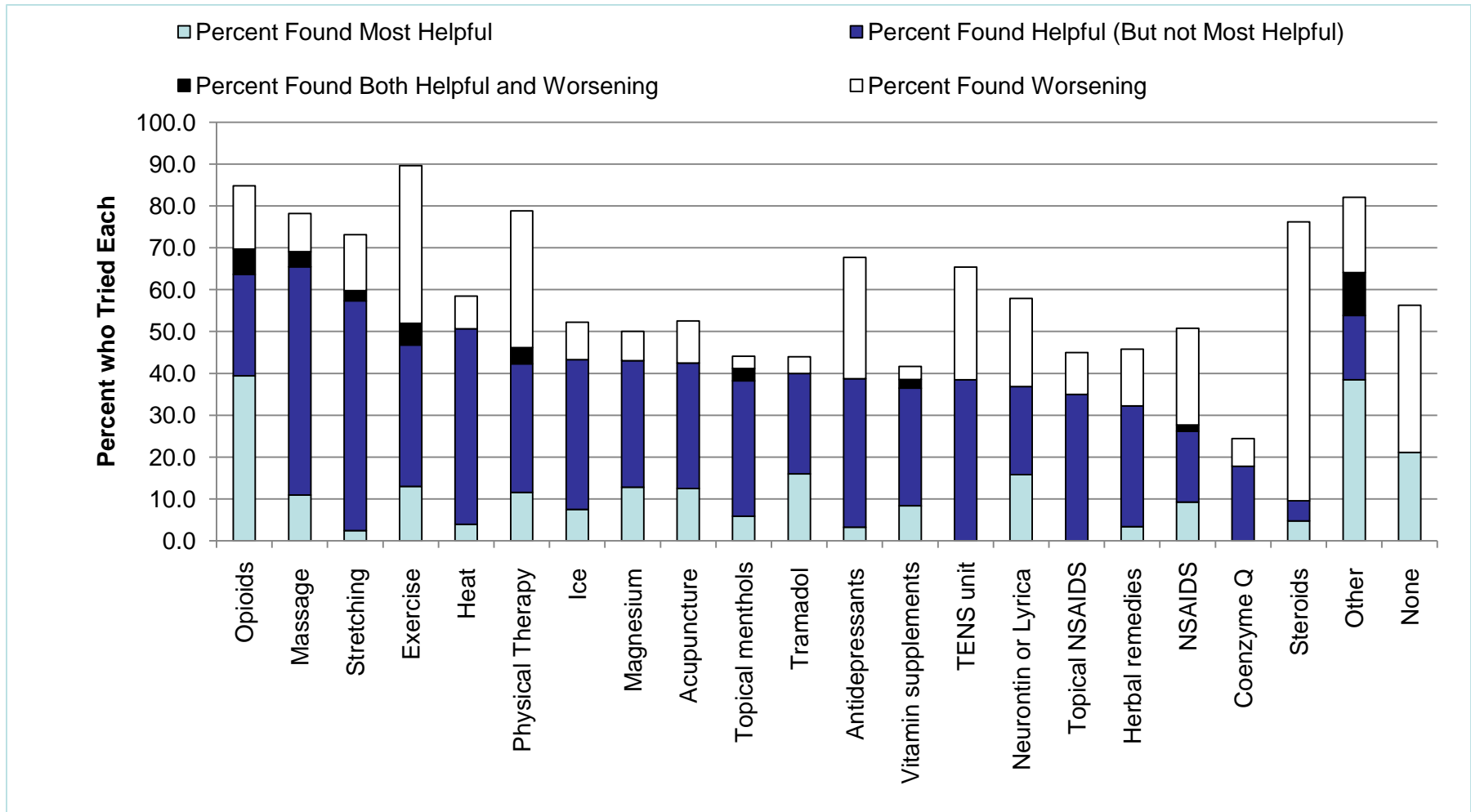
Treatment	Count Found Worsened	Number Tried (n)	Percent	95% CI
Steroids	14	21	66.7	NA
Exercise	33	77	42.8	[31.8, 53.9]
Physical Therapy	19	52	36.5	[23.4, 49.7]
Antidepressants	9	31	29.0	NA
TENS unit	7	26	26.9	NA
NSAIDS	16	65	24.6	NA
Opioids	7	33	21.2	NA
Neurontin or Lyrica	4	19	21.0	NA
Nerve blocks/ injections	1	5	20.0	NA
Stretching	13	82	15.8	NA
Herbal remedies	8	59	13.6	NA
Massage	7	55	12.7	NA
Acupuncture	4	40	10.0	NA
Topical NSAIDS	2	20	10.0	NA
Ice	6	67	9.0	NA
Heat	6	77	7.8	NA
Magnesium	6	86	7.0	NA
Coenzyme Q	3	45	6.7	NA
Topical menthols	2	34	5.9	NA
Vitamin supplements	5	96	5.2	NA
Tramadol	1	25	4.0	NA
Other	11	39	28.2	NA
None	45	128	35.2	[26.9, 43.4]

Treatments that Worsened Symptoms



Proportion Helpful or Most Helpful or Worsening

- Comparison of treatments that were helpful or most helpful or worsening (where n >= 15).
- Note the high ratio of disagreement with: Exercise, Physical Therapy, Antidepressants, TENS, and NSAIDs.
- Steroids usually worsened symptoms.



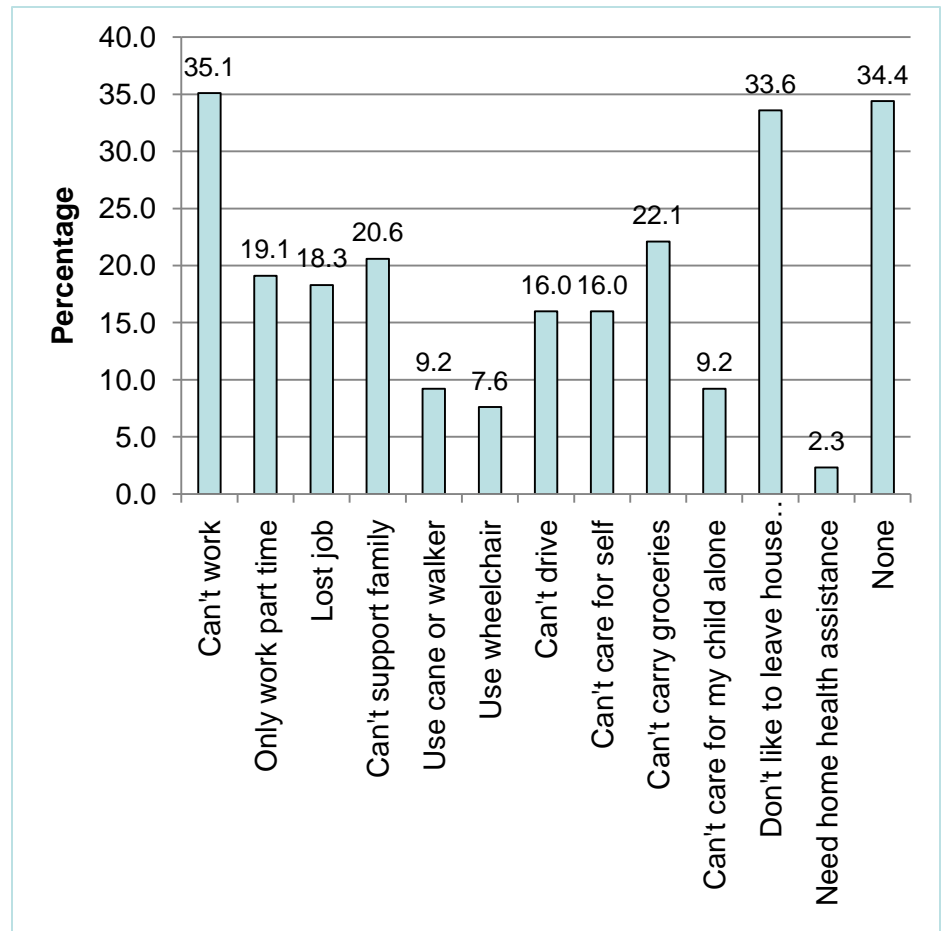
Work and Living Situation

Please check all that apply regarding your work and living situation.

Work/Living	Count (n=131)	Percent
I can't work at all because of my health.	46	35.1
I can only work part time because of my health.	25	19.1
I have lost my job as a result of my health.	24	18.3
I can't support my family as a result of my health.	27	20.6
I have to use a cane or walker.	12	9.2
I have to use a wheelchair.	10	7.6
I can't drive because of my health.	21	16.0
I can't take care of myself.	21	16.0
I can't carry groceries.	29	22.1
I can't care for my child alone.	12	9.2
I don't like to leave the house because of disability.	44	33.6
I need home health assistance (hygiene, meals on wheels, medications, blood draws, etc.)	3	2.3
None	45	34.4

Observations:

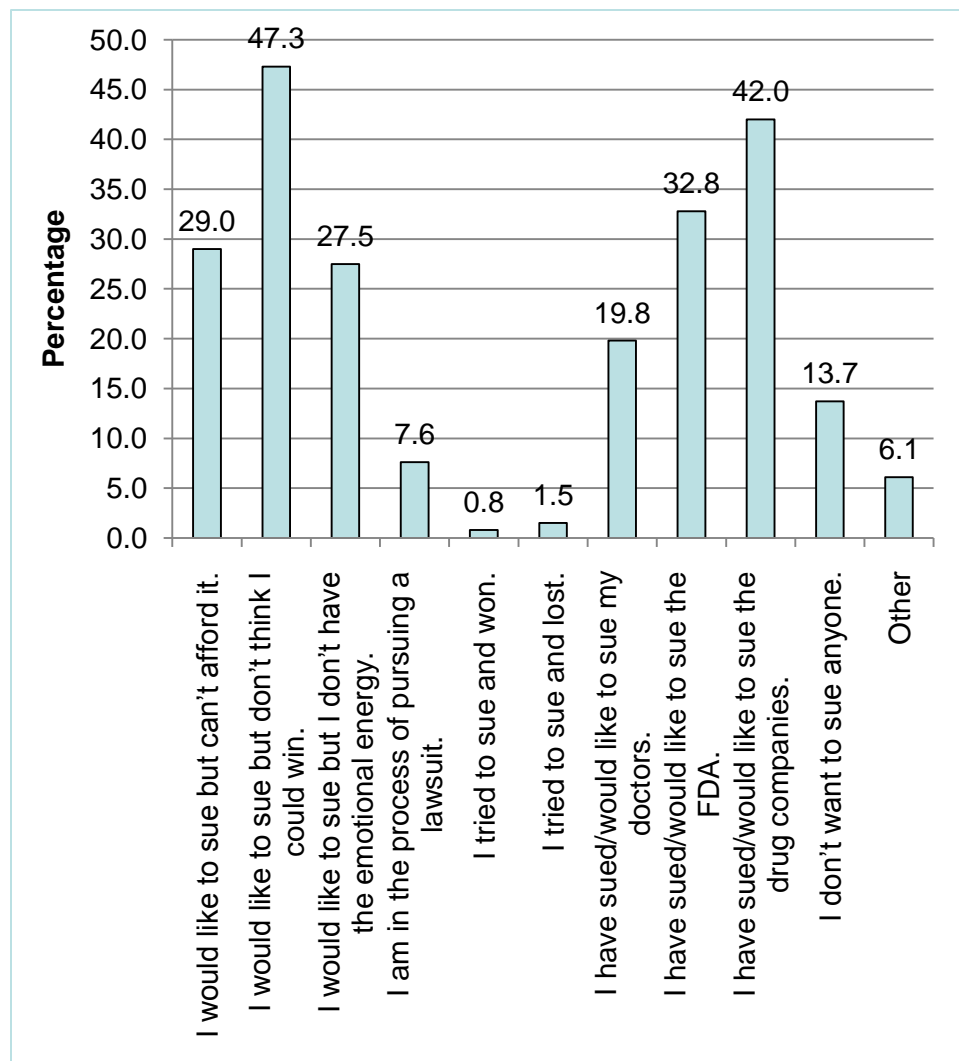
- More than a third (35.1)% of respondents can not work at all because of their health.
- Nearly 34% of respondents do not like to leave the house because of disability.



Legal Actions

Please check all that apply about legal action.

Legal action	Count (n=131)	Percent
I would like to sue but can't afford it.	38	29.0
I would like to sue but don't think I could win.	62	47.3
I would like to sue but I don't have the emotional energy.	36	27.5
I am in the process of pursuing a lawsuit.	10	7.6
I tried to sue and won.	1	0.8
I tried to sue and lost.	2	1.5
I have sued/would like to sue my doctors.	26	19.8
I have sued/would like to sue the FDA.	43	32.8
I have sued/would like to sue the drug companies.	55	42.0
I don't want to sue anyone.	18	13.7
Other	8	6.1



Observations:

- Many people would like to sue, but they don't think that they could win, or they don't have the money or emotional energy.
- People would most like to sue the drug companies first, and then the FDA.

Statistics Reminder

- Surveys and studies examine participants and samples that due to natural chance do not perfectly represent the overall population of which they are a subset. Statistical tests take into account this natural chance.
- P-value is the probability that a particular statistical result would occur by random chance.
- A P-value of 1.0 represents 100% likelihood a result would occur by chance; 0.05 represents 5% likelihood, etc.
- In tests for differences, P-values of less than 0.05 are considered sufficiently statistically relevant to identify that a difference is not just due to chance.
- Levels of 0.05, 0.01, 0.001, and 0.0001 are commonly used in medical literature as markers for increasing strength of a finding.
- The 95% Confidence Interval (or 95% CI) as applied to proportions is the range listed [lowest, highest] that theoretically has a 95% likelihood of covering the actual overall population proportion.

Statistical Tests on Foods

Tests regarding the probability that Food Issues could be due to chance.

- Proportions were compared to the Null hypothesis—there is no relationship with food and symptoms.
- P-value is the probability that a proportion occurs by chance.
- All t-Test P-values were less than 0.001 (0.1%).

Symptoms/Food	Count (n=131)	Percent	t-Test criteria	t-Test P-Value
I do not tolerate caffeine.	46	35.1	prop. > 0	< 0.0001
My symptoms are worse with sugar.	40	30.5	prop. > 0	< 0.0001
My symptoms are worse with soy.	30	22.9	prop. > 0	< 0.0001
My symptoms are worse with meats.	17	13.0	prop. > 0	< 0.0001
My symptoms are worse with dairy.	15	11.4	prop. > 0	< 0.0001
My symptoms are worse with seafood.	10	7.6	prop. > 0	< 0.001
Other	32	24.4	prop. > 0	< 0.0001
Food does not seem to affect my symptoms.	48	36.6	prop. < 100%	< 0.0001

Notes

Calculations for Confidence Intervals and t-Tests taken from:

- Wild CJ and Seber GAF. *Chance Encounters: A First Course in Data Analysis and Inference*. New York: John Wiley & Sons, Inc; 2000.

Suggested Reading

- Hall MM, Finnoff JT, Smith J. *Musculoskeletal complications of fluoroquinolones: guidelines and precautions for usage in the athletic population.* PM R. 2011 Feb;3(2):132-42. PMID: 21333952.
- Kim GK. *The risk of fluoroquinolone-induced tendinopathy and tendon rupture: what does the clinician need to know?* J Clin Aesthet Dermatol. 2010 Apr;3(4):49-54. PMID: 20725547.
- Cohen, JS. *Peripheral neuropathy associated with fluoroquinolones.* Ann Pharmacother. 2001 Dec;35(12):1540-7. PMID:11793615.
- Hedenmalm K, Spigset O. *Peripheral sensory disturbances related to treatment with fluoroquinolones.* J Antimicrob Chemother.1996;37:831-7. PMID: 8722551.
- Schaumann R, Rodloff A.C. *Activities of quinolones against obligately anaerobic bacteria.* Anti-Infective Agents in Medical Chemistry. 2007, 6, 49-56.
- De Sarro A, De Sarro G. *Adverse reactions to fluoroquinolones. an overview on mechanistic aspects.* Curr. Med. Chem. 2001 Mar, 8 (4): 371–84. PMID 11172695.

About the QVF

Our Mission:

The Mission of the Quinolone Vigilance Foundation is to understand and reduce Quinolone Toxicity as a cause of human suffering in the world.

To fulfill the Mission, we will:

- Network medical professionals and researchers.
- Foster, initiate, and direct fundamental research to discover underlying toxicity mechanisms.
- Fund research that will produce the most promising results.
- Translate new discoveries into effective medical practices, therapies and public health approaches.
- Develop and apply discovered knowledge to educate the medical community and help alleviate individual suffering.

Please visit our website and join our mailing list for research and advocacy updates at:

<http://www.saferpills.org/>

