

# Learn from Outputs — Supervision Matching

This notebook documents the supervision matcher pipeline so you can re-run every step and inspect the outputs.

## Run everything

- Choose `Kernel → Restart & Run All` to regenerate synthetic data, retrain the model, and refresh the diagnostics.
- Every code cell ultimately calls `python supervision_tool.py generate build train score`, keeping the notebook reproducible.

## Sections

1. Hard filters (exact state + license matching).
2. Availability similarity model (TF-IDF + cosine).
3. Capacity-aware greedy assignment.
4. Diagnostics & next steps.

## Run the full pipeline from here

This cell runs the CLI so the notebook stays in sync with the latest synthetic data and model artifacts.

```
In [1]: !python supervision_tool.py generate build train score
```

```

=== generate ===
Wrote synthetic supervisors & associates.
done.

=== build ===
Wrote pairs -> /home/connor/Sophias_Mom/ai_matching/Supervision_HistoricalPairs_SYNTH.csv
done.

=== train ===
=== Validation Report ===
/home/connor/Sophias_Mom/venv/lib/python3.13/site-packages/sklearn/metrics/_classification.py:1731: UndefinedMetricWarning: Precision is ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, f"{metric.capitalize()} is", result.shape[0])
/home/connor/Sophias_Mom/venv/lib/python3.13/site-packages/sklearn/metrics/_classification.py:1731: UndefinedMetricWarning: Precision is ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, f"{metric.capitalize()} is", result.shape[0])
/home/connor/Sophias_Mom/venv/lib/python3.13/site-packages/sklearn/metrics/_classification.py:1731: UndefinedMetricWarning: Precision is ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, f"{metric.capitalize()} is", result.shape[0])
precision    recall  f1-score   support

      0       0.00      0.00      0.00         9
      1       0.84      1.00      0.91        48

 accuracy          0.84         57
 macro avg       0.42      0.50      0.46         57
weighted avg       0.71      0.84      0.77         57

Saved model -> /home/connor/Sophias_Mom/ai_matching/supervision_pair_model.joblib
done.

=== score ===
Wrote -> /home/connor/Sophias_Mom/ai_matching/supervision_matches.csv
Wrote -> /home/connor/Sophias_Mom/ai_matching/associates_unassigned.csv
done.

```

## 0) Load generated artifacts

Inspect the fresh CSVs and model bundle produced by the pipeline run above.

```

In [2]: from pathlib import Path
import pandas as pd

pairs_csv = Path('Supervision_HistoricalPairs_SYNTH.csv')
matches_csv = Path('supervision_matches.csv')

```

```

unassigned_csv = Path('associates_unassigned.csv')
model_path = Path('supervision_pair_model.joblib')

print('Found files:')
for p in [pairs_csv, matches_csv, unassigned_csv, model_path]:
    print(' -', p.resolve(), 'exists?' , p.exists())

pairs = pd.read_csv(pairs_csv) if pairs_csv.exists() else None
matches = pd.read_csv(matches_csv) if matches_csv.exists() else None
unassigned = pd.read_csv(unassigned_csv) if unassigned_csv.exists() else None

if pairs is not None:
    display(pairs.head())
if matches is not None:
    display(matches.head())
if unassigned is not None:
    display(unassigned.head())

```

Found files:

```

- /home/connor/Sophias_Mom/ai_matching/Supervision_HistoricalPairs_SYNTH.csv
exists? True
- /home/connor/Sophias_Mom/ai_matching/supervision_matches.csv exists? True
- /home/connor/Sophias_Mom/ai_matching/associates_unassigned.csv exists? True
- /home/connor/Sophias_Mom/ai_matching/supervision_pair_model.joblib exists?
True

```

assoc_idx	sup_idx	Associate	Associate Email	Associate State	Associate License	Associate Availability
0	0	Dakota Wilson	dakota.wilson@sample.org	VA	Social Worker	Mond 10:30 A Tuesd 11:00 A Tuesd 12
1	4	Sam Martinez	sam.martinez@mail.net	IA	Marriage and Family Therapist	Mond 11:30 A Mond 4:30 P Mond 5:00 F
2	4	Sam Martinez	sam.martinez@mail.net	IA	Marriage and Family Therapist	Mond 11:30 A Mond 4:30 P Mond 5:00 F
3	4	Sam Martinez	sam.martinez@mail.net	IA	Marriage and Family Therapist	Mond 11:30 A Mond 4:30 P Mond 5:00 F
4	5	Rowan Garcia	rowan.garcia@sample.org	TN	Social Worker	Mond 11:00 A Mond 1:30 P Tuesd 9:30

	assoc_idx	sup_idx	Associate	Associate Email	Associate State	Associate License	Ass Avail
0	169	47	Harper Chen	harper.chen@example.com	IL	Marriage and Family Therapist	11:00 AM - 5:00 PM
1	64	99	Casey Clark	casey.clark@mail.net	MN	Psychologist	10:00 AM - 4:00 PM
2	129	27	Alex Cooper	alex.cooper@example.com	OK, TN, RI	Marriage and Family Therapist	12:00 PM - 2:00 PM
3	187	79	Emerson Reed	emerson.reed@example.com	WV	Marriage and Family Therapist	5:00 PM - 6:00 PM
4	35	67	Skyler Rivera	skyler.rivera@example.com	MN	Counselor	10:00 AM - 2:00 PM

	Timestamp	Email Address	Name	State	License Type	Availability
0	NaN	alex.davis@example.com	Alex Davis	ME	Counselor	Monday 5:00 PM, Tuesday 12:30 PM, Tuesday 4:30...
1	NaN	logan.cooper@mail.net	Logan Cooper	MD	Marriage and Family Therapist	Tuesday 8:30 AM, Thursday 12:00 PM, Thursday 2...
2	NaN	harper.brooks@sample.org	Harper Brooks	AR	Marriage and Family Therapist	Monday 5:30 PM, Tuesday 9:00 AM, Tuesday 4:30 ...
3	NaN	logan.jenkins@sample.org	Logan Jenkins	PA	Psychologist	Monday 5:30 PM, Tuesday 10:00 AM, Tuesday 12:0...
4	NaN	peyton.gonzalez@mail.net	Peyton Gonzalez	AL	Psychologist	Monday 8:30 AM, Monday 12:00 PM, Monday 5:30 P...

## 1) Hard filters (exact matches)

No machine learning here—just deterministic business logic before we consider availability:

- `State` comparisons now treat licenses as sets, so a supervisor licensed in multiple states will match as long as there is overlap with the associate.
- `License Type` must appear in the supervisor's `Who can you supervise?` list (we accept comma or semicolon separated values).

Implementation lives in `matcher_lib.py` (`parse_state_list`, `parse_license_list`, and `deterministic_filter`).

## Deterministic filter snapshot

Run the helper to see how many candidate pairs remain after enforcing state + license rules.

```
In [3]: from pathlib import Path
import pandas as pd
from matcher_lib import deterministic_filter

supervisors_path = Path('Supervision_Supervisors_SYNTH.csv')
associates_path = Path('Supervision_Associates_SYNTH.csv')

if supervisors_path.exists() and associates_path.exists():
```

```

supervisors_df = pd.read_csv(supervisors_path)
associates_df = pd.read_csv(associates_path)
filtered = deterministic_filter(supervisors_df, associates_df)
print('Candidate rows remaining after hard filters:', len(filtered))
display(filtered.head())
else:
    print('Missing CSV inputs – run the pipeline cell above first.')

```

Candidate rows remaining after hard filters: 283

	assoc_idx	sup_idx	Associate	Associate Email	Associate State	Associate License	Associate Availability
0	0	22	Dakota Wilson	dakota.wilson@sample.org	VA	Social Worker	Mond 10:30 A Tuesd 11:00 A Tuesd 12
1	4	28	Sam Martinez	sam.martinez@mail.net	IA	Marriage and Family Therapist	Mond 11:30 A Mond 4:30 P Mond 5:00 F
2	4	56	Sam Martinez	sam.martinez@mail.net	IA	Marriage and Family Therapist	Mond 11:30 A Mond 4:30 P Mond 5:00 F
3	4	58	Sam Martinez	sam.martinez@mail.net	IA	Marriage and Family Therapist	Mond 11:30 A Mond 4:30 P Mond 5:00 F
4	5	68	Rowan Garcia	rowan.garcia@sample.org	TN	Social Worker	Mond 11:00 A Mond 1:30 P Tuesd 9:30

## 2) Availability similarity (machine learning)

Feasible pairs are scored by how well their 30-minute availability blocks line up. Slots run every half hour from **8:00 AM through 6:00 PM**.

1. TF-IDF vectorize each availability string.

2. Cosine similarity becomes `AvailabilityScore` ; literal slot overlap becomes `AvailabilityOverlap` .
3. A logistic regression blends those signals (plus capacity) to mimic historical choices.

The synthetic dataset leans positive, so expect mostly "match" examples unless you inject more intentionally bad pairings.

```
In [4]: import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.pipeline import Pipeline
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import (classification_report, confusion_matrix,
                             ConfusionMatrixDisplay, precision_recall_curve,
                             average_precision_score)

if pairs is not None:
    feat_cols = ['AvailabilityOverlap', 'AvailabilityScore']
    if 'Capacity' in pairs.columns:
        feat_cols.append('Capacity')
    elif 'SupervisorCapacity' in pairs.columns:
        feat_cols.append('SupervisorCapacity')

    X = pairs[feat_cols]
    y = pairs['Label']
    X_tr, X_va, y_tr, y_va = train_test_split(
        X, y, test_size=0.2, stratify=y, random_state=42
    )

    pipe = Pipeline([
        ('scaler', StandardScaler()),
        ('clf', LogisticRegression(max_iter=2000))
    ])
    pipe.fit(X_tr, y_tr)
    accuracy = pipe.score(X_va, y_va)
    print(f'Validation accuracy: {accuracy:.3f}')
    print('Note: synthetic data is heavily positive, so the confusion matrix

    print('=== Validation (zero_division=0) ===')
    print(classification_report(y_va, pipe.predict(X_va), zero_division=0))

    y_pred = pipe.predict(X_va)
    cm = confusion_matrix(y_va, y_pred, labels=[0, 1])
    tn, fp, fn, tp = cm[0, 0], cm[0, 1], cm[1, 0], cm[1, 1]
    disp = ConfusionMatrixDisplay(cm, display_labels=[0, 1])
    disp.plot(values_format='d')
    plt.title('Confusion Matrix (Validation)')
    print(f'Confusion-matrix counts → TN={tn}, FP={fp}, FN={fn}, TP={tp}')
    print('Dark purple cells mean zero pairs; brighter yellow/green highlight

    plt.show()

    y_score = pipe.predict_proba(X_va)[:, 1]
    prec, rec, thr = precision_recall_curve(y_va, y_score)
    ap = average_precision_score(y_va, y_score)
```



```

plt.figure()
plt.plot(rec, prec)
plt.xlabel('Recall')
plt.ylabel('Precision')
plt.title(f'Precision-Recall (AP={ap:.3f})')
plt.grid(True, alpha=0.3)
plt.show()
else:
    print('Pairs not found – run the pipeline cell first.')

```

Validation accuracy: 0.842

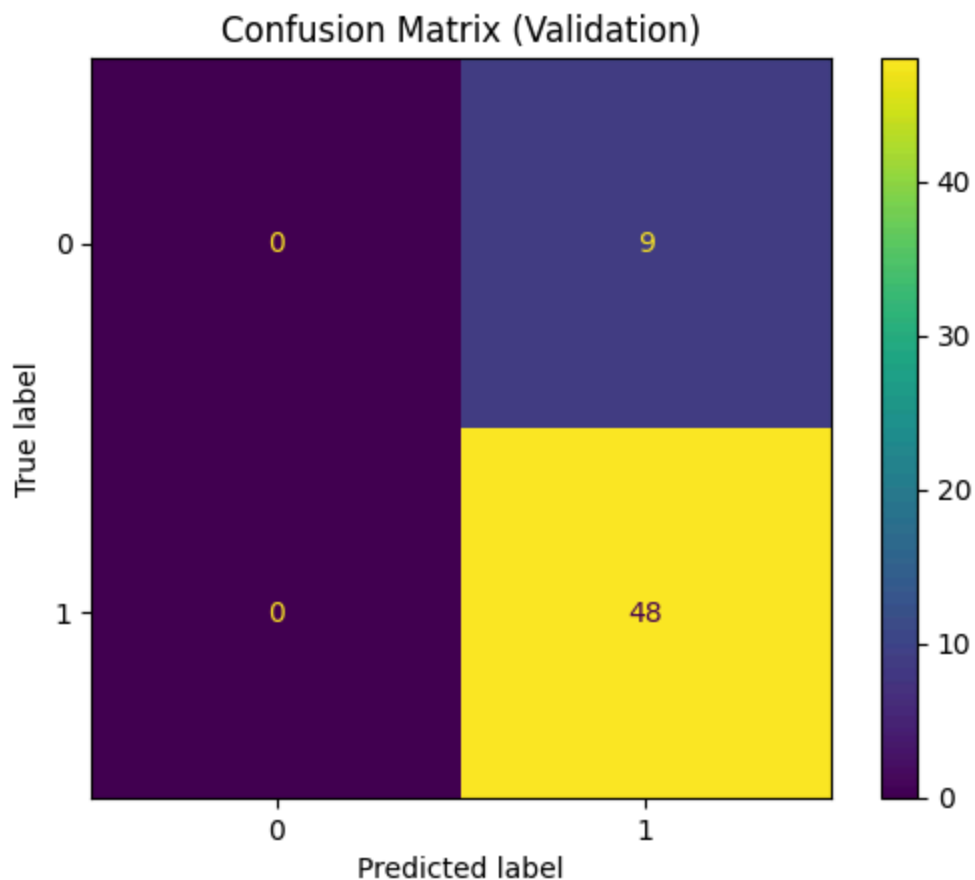
Note: synthetic data is heavily positive, so the confusion matrix collapses to a single class.

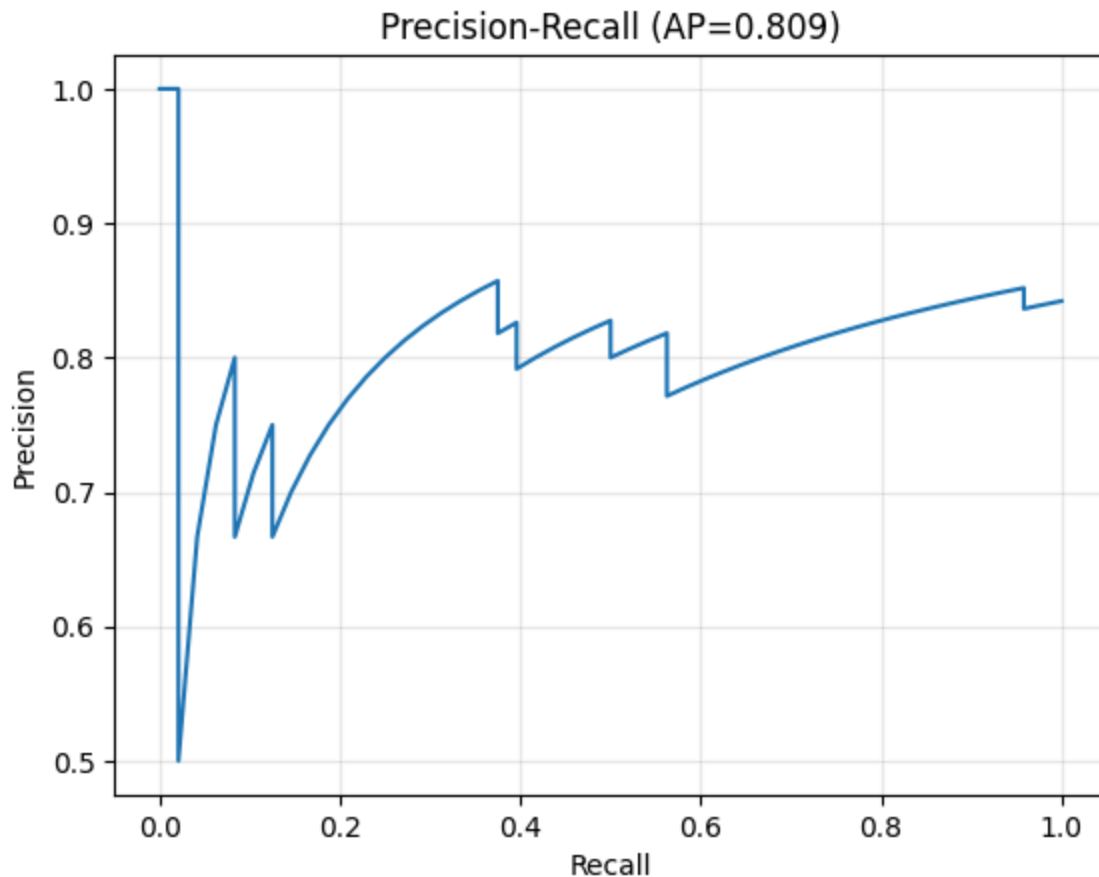
=== Validation (zero\_division=0) ===

	precision	recall	f1-score	support
0	0.00	0.00	0.00	9
1	0.84	1.00	0.91	48
accuracy			0.84	57
macro avg	0.42	0.50	0.46	57
weighted avg	0.71	0.84	0.77	57

Confusion-matrix counts → TN=0, FP=9, FN=0, TP=48

Dark purple cells mean zero pairs; brighter yellow/green highlights larger counts. The lower-right value is the correctly predicted matches (true positives).





## Interpreting the confusion matrix

Colors follow the default viridis scale: dark purple means zero pairs, green/yellow marks higher counts. The lower-right number represents the true positives (correctly predicted matches), and the printed legend under the chart restates each cell so you can narrate results live.

## 3) Capacity-aware greedy assignment

After scoring, we sort pairs by the ML score and walk the list once: assign each associate to the highest-rated supervisor who still has remaining `Capacity`. That greedy pass guarantees we never overbook anyone.

```
In [5]: if matches is not None:
        print('Rows:', len(matches))
        if 'assoc_idx' in matches.columns:
            print('Duplicate associate assignments:', matches['assoc_idx'].duplicated())
        else:
            print('assoc_idx missing; skip duplicate check.')
        if 'sup_idx' in matches.columns and 'Capacity' in matches.columns:
            used = matches.groupby('sup_idx').size().rename('assigned')
            cap = matches[['sup_idx', 'Capacity']].drop_duplicates().set_index('sup_idx')
            cap_check = used.to_frame().join(cap, how='left')
```

```

        cap_check['over'] = cap_check['assigned'] - cap_check['Capacity']
        print('Any supervisors over capacity? ->', (cap_check['over']>0).any)
        display(cap_check.head(10))
    else:
        print('sup_idx/Capacity missing; skip capacity check.')
else:
    print('Matches not found.')

```

Rows: 141

Duplicate associate assignments: 0

Any supervisors over capacity? -> False

	assigned	Capacity	over
sup_idx			
0	1	6	-5
2	2	4	-2
3	1	2	-1
4	1	6	-5
5	5	5	0
6	3	4	-1
9	1	5	-4
11	2	3	-1
13	2	2	0
14	2	3	-1

## 4) Peek inside saved model (feature weights)

```

In [6]: from joblib import load
import pandas as pd

if model_path.exists():
    bundle = load(model_path)
    model = bundle['model']; feats = bundle['features']
    try:
        coef = model.named_steps['clf'].coef_.ravel()
        display(pd.DataFrame({'feature': feats, 'weight': coef}).sort_values)
    except Exception as e:
        print('Could not read coefficients:', e)
else:
    print('Model not found.')

```

	feature	weight
2	Capacity	1.082981
0	AvailabilityOverlap	-0.232393
1	AvailabilityScore	-0.288943

## 5) Diagnostics & tuning ideas

Use these outputs to audit the matching pipeline. For confusion matrices as rich as the fruit classifier example, curate a dataset with meaningful negatives or engineered availability features (e.g., binary columns for each day/slot).

- Add tougher negative pairs or class weighting to balance the training data.
- Engineer structured availability features ( `Monday 08:00 AM`, `Tuesday 02:30 PM`, ...) for more expressive models.
- Replace the greedy assignment with an optimal matcher (Hungarian/ILP) if capacity juggling becomes complex.

## 6) Match outcomes overview

Re-run the cell below after each pipeline execution to refresh totals, highlight top pairings, and show capacity utilization for the demo.

```
In [7]: import pandas as pd
from IPython.display import display, Markdown

def _fmt_pct( numer, denom ):
    return f"{{(numer/denom*100):.1f}}%" if denom and denom > 0 else 'n/a'

if matches is not None:
    total_matches = len(matches)
    matched_associates = matches['Associate'].unique()
    matched_supervisors = matches['Supervisor'].unique()
    total_associates = len(associates_df) if 'associates_df' in globals() else 0
    total_supervisors = len(supervisors_df) if 'supervisors_df' in globals() else 0
    unassigned_count = len(unassigned) if unassigned is not None else None

    assoc_pct = _fmt_pct( matched_associates, total_associates ) if total_associates > 0 else 0
    sup_pct = _fmt_pct( matched_supervisors, total_supervisors ) if total_supervisors > 0 else 0

    headline = (f"Matched {{matched_associates}} of {{total_associates}} associates" if total_associates
                else f"Matched associates: {{matched_associates}}")
    headline_sup = (f"Supervisors engaged: {{matched_supervisors}} of {{total_supervisors}}")
                if total_supervisors else f"Supervisors engaged: {{matched_supervisors}}")
    waiting = (f"Associates still waiting: {{unassigned_count}}")
                if unassigned_count is not None else "Associates still waiting"

    display(Markdown(
```

```

    """ Hackathon-ready snapshot """
    f"- {headline}"
    f"- {headline_sup}"
    f"- {waiting}"
    f"- Average final score: {matches['final_score'].mean():.3f}"
    f"- Average availability score: {matches['AvailabilityScore'].mean()
)

summary_rows = [
    ('Total matches generated', total_matches),
    ('Associates matched', f"{matched_associates} / {total_associates} (",
    ('Supervisors participating', f"{matched_supervisors} / {total_super",
    ('Associates still unassigned', unassigned_count),
    ('Average final score', f"{matches['final_score'].mean():.3f}"),
    ('Average availability score', f"{matches['AvailabilityScore'].mean(
]
summary_df = pd.DataFrame(summary_rows, columns=['Metric', 'Value'])
display(summary_df)

top_matches = (matches[['Associate', 'Supervisor', 'Associate State', 'Supe
                        'AvailabilityOverlap', 'AvailabilityScore', 'final_
                        .sort_values('final_score', ascending=False)
                        .head(10))
print('Top 10 matches by final score:')
display(top_matches)

capacity_usage = (matches.groupby(['Supervisor', 'Capacity']).size()
                  .rename('Assigned')
                  .reset_index())
capacity_usage['Remaining'] = capacity_usage['Capacity'] - capacity_usag
print('Capacity snapshot (next 10 most utilized supervisors):')
display(capacity_usage.sort_values(['Remaining', 'Assigned']).head(10))
else:
    print('Matches not found - run the pipeline cell first.')

```

Hackathon-ready snapshot- Matched 141 of 200 associates (70.5%)- Supervisors engaged: 71 of 120 (59.2%)- Associates still waiting: 59- Average final score: 0.803- Average availability score: 0.710

	Metric	Value
0	Total matches generated	141
1	Associates matched	141 / 200 (70.5%)
2	Supervisors participating	71 / 120 (59.2%)
3	Associates still unassigned	59
4	Average final score	0.803
5	Average availability score	0.710

Top 10 matches by final score:

	Associate	Supervisor	Associate State	Supervisor State	AvailabilityOverlap	AvailabilityScore	final
0	Harper Chen	Alex Bennett	IL	IL	2	0.874573	0.
1	Casey Clark	Jordan Ramirez	MN	MN	1	0.838486	0.
2	Alex Cooper	Kendall Martinez	OK, TN, RI	OK	2	0.847485	0.
3	Emerson Reed	Sam Nguyen	WV	WV	2	0.835162	0.
4	Skyler Rivera	Quinn Hernandez	MN	RI, MD, MN	1	0.793352	0.
5	Peyton Ramirez	Dakota Chen	MA	MA	0	0.782417	0.
6	Casey Nguyen	Elliot Chen	FL	FL	1	0.791736	0.
7	Finley Lee	Jordan Ramirez	MN	MN	3	0.818111	0.
8	Elliot Reed	Alex Bennett	IL	IL	1	0.785196	0.
9	Jamie Parker	Kendall Martinez	OK	OK	2	0.794775	0.

Capacity snapshot (next 10 most utilized supervisors):

	Supervisor	Capacity	Assigned	Remaining
46	Reese Brooks	2	2	0
51	Reese Martinez	2	2	0
53	Riley Brown	2	2	0
69	Taylor Gonzalez	2	2	0
33	Jordan Brown	3	3	0
65	Skyler Davis	3	3	0
20	Elliot Clark	4	4	0
29	Hayden Moore	5	5	0
62	Sam Hernandez	5	5	0
0	Alex Bennett	6	6	0

## 7) Visualize match coverage

Quick visuals to showcase how capacity is being used and where associates remain unmatched.

```
In [8]: import matplotlib.pyplot as plt
import numpy as np

if matches is not None:
    sup_usage = (matches.groupby(['Supervisor', 'Capacity']).size()
                  .rename('Assigned')
                  .reset_index())
    sup_usage['Remaining'] = sup_usage['Capacity'] - sup_usage['Assigned']
    top_sup = sup_usage.sort_values('Assigned', ascending=False).head(10)

    def _split_state(value):
        if not isinstance(value, str):
            return []
        parts = [p.strip() for p in value.replace(';', ',').split(',') if p.s
        return parts or ['Unknown']

    if unassigned is not None and len(unassigned):
        state_counts = {}
        for s in unassigned['State']:
            for part in _split_state(s):
                state_counts[part] = state_counts.get(part, 0) + 1
        state_df = (pd.Series(state_counts, name='Unassigned')
                    .sort_values(ascending=False)
                    .head(10)
                    .reset_index()
                    .rename(columns={'index': 'State'}))
    else:
        state_df = pd.DataFrame({'State': [], 'Unassigned': []})

fig, axes = plt.subplots(1, 2, figsize=(14, 5))

if not top_sup.empty:
    ax = axes[0]
    y = np.arange(len(top_sup))
    ax.barh(y, top_sup['Capacity'], color='#d0d7de', label='Capacity')
    ax.barh(y, top_sup['Assigned'], color='#2da44e', label='Assigned')
    ax.set_yticks(y)
    ax.set_yticklabels(top_sup['Supervisor'])
    ax.invert_yaxis()
    ax.set_xlabel('Slots')
    ax.set_title('Top supervisors by fill rate')
    ax.legend()
else:
    axes[0].axis('off')
    axes[0].text(0.5, 0.5, 'No matches yet', ha='center', va='center')

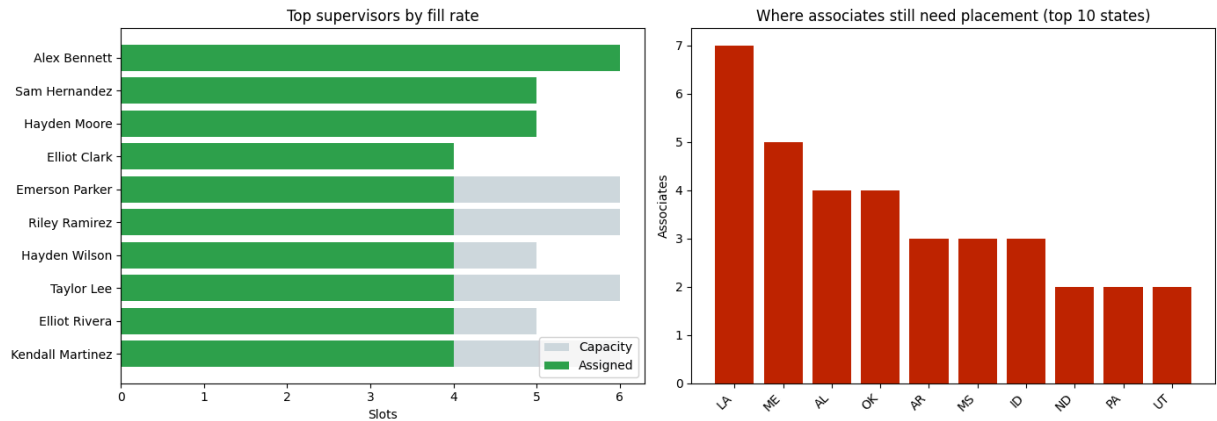
if not state_df.empty:
    ax = axes[1]
    ax.bar(state_df['State'], state_df['Unassigned'], color='#bf2600')
    ax.set_ylabel('Associates')
    ax.set_title('Where associates still need placement (top 10 states)')
    plt.setp(ax.get_xticklabels(), rotation=45, ha='right')
```

```

else:
    axes[1].axis('off')
    axes[1].text(0.5, 0.5, 'Everyone matched!', ha='center', va='center')

plt.tight_layout()
plt.show()
else:
    print('Matches not found – run the pipeline cell first.')

```



## 8) Visual roster and drivers

A single dashboard: donut for match coverage, bar chart for why pairs fail, and a color-coded roster so you can tour every associate quickly.

```

In [9]: import pandas as pd
import matplotlib.pyplot as plt

if 'associates_df' in globals() and associates_df is not None:
    roster = associates_df.rename(columns={
        'Name': 'Associate',
        'State': 'Associate State',
        'License Type': 'Associate License',
        'Availability': 'Associate Availability'
    }).copy()
    if matches is not None:
        enrich_cols = ['Associate', 'Supervisor', 'Supervisor State',
                        'AvailabilityOverlap', 'AvailabilityScore', 'final_score']
        roster = roster.merge(matches[enrich_cols], on='Associate', how='left')
    else:
        roster['Supervisor'] = pd.NA
        roster['Supervisor State'] = pd.NA
        roster['AvailabilityOverlap'] = pd.NA
        roster['AvailabilityScore'] = pd.NA
        roster['final_score'] = pd.NA

    roster['Match Status'] = roster['Supervisor'].fillna('').replace('', 'Unassigned')
    roster.loc[roster['Match Status'] != 'Unassigned', 'Match Status'] = 'Matched'

    match_counts = roster['Match Status'].value_counts()
    reasons = None

```



```

if 'pairs' in globals() and pairs is not None:
    reasons = pairs[pairs['Label'] == 0]['Reason'].value_counts().head(6)

fig, axes = plt.subplots(1, 2, figsize=(13, 5))

colors = ['#2da44e', '#bf2600']
axes[0].pie(match_counts, labels=match_counts.index, autopct='%1.1f%%',
axes[0].set_title('Match coverage')
axes[0].axis('equal')

if reasons is not None and not reasons.empty:
    axes[1].bar(reasons.index, reasons.values, color='#f9aa33')
    axes[1].set_title('Top reasons pairs fail hard filters/ML')
    axes[1].set_ylabel('Pairs')
    plt.setp(axes[1].get_xticklabels(), rotation=30, ha='right')
else:
    axes[1].axis('off')
    axes[1].text(0.5, 0.5, 'No negative pairs in sample', ha='center', v

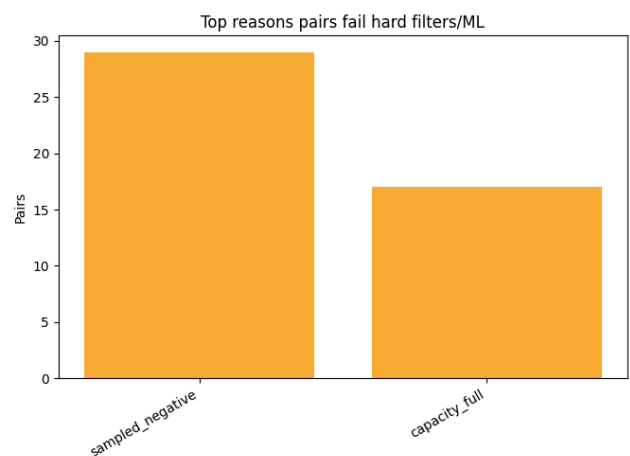
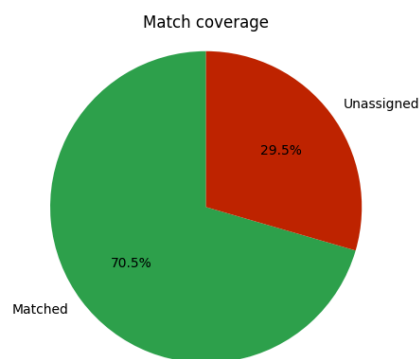
plt.tight_layout()
plt.show()

roster_view = roster[['Associate', 'Associate State', 'Associate License',

def status_style(val):
    if val == 'Matched':
        return 'background-color:#2da44e; color:white'
    if val == 'Unassigned':
        return 'background-color:#bf2600; color:white'
    return ''

styled = (roster_view.style
    .applymap(status_style, subset=['Match Status'])
    .background_gradient(cmap='Blues', subset=['final_score', 'Avail
    .format({'final_score': '{:.3f}', 'AvailabilityScore': '{:.3f}')),
display(styled)
else:
    print('Associates dataset not loaded - run the earlier cells first.')

```



```

/tmp/ipykernel_40243/1544283327.py:59: FutureWarning: Styler.applymap has been
deprecated. Use Styler.map instead.
    .applymap(status_style, subset=['Match Status'])

```

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
0	Dakota Wilson	VA	Social Worker	Matched	Casey Bennett	VA	0.774	
1	Alex Davis	ME	Counselor	Unassigned	—	—	—	
2	Logan Cooper	MD	Marriage and Family Therapist	Unassigned	—	—	—	
3	Harper Brooks	AR	Marriage and Family Therapist	Unassigned	—	—	—	
4	Sam Martinez	IA	Marriage and Family Therapist	Matched	Taylor Lee	IA	0.857	
5	Rowan Garcia	TN	Social Worker	Matched	Reese Brooks	TN	0.689	
6	Avery Hernandez	CA	Counselor	Matched	Emerson Parker	CA	0.813	
7	Taylor Lopez	WI	Psychologist	Matched	Rowan Wilson	WI	0.773	
8	Morgan Patel	MO	Psychologist	Matched	Drew Parker	MO, NM	0.734	
9	Jamie Bennett	MA	Counselor	Matched	Riley Ramirez	PA, MA	0.825	
10	Logan Jenkins	PA	Psychologist	Unassigned	—	—	—	
11	Hayden Lee	UT	Marriage and Family Therapist	Matched	Avery Ramirez	UT	0.733	
12	Casey Ramirez	WA	Psychologist	Matched	Hayden Wilson	WA	0.720	
13	Peyton Gonzalez	AL	Psychologist	Unassigned	—	—	—	
14	Skyler Wilson	AR	Psychologist	Unassigned	—	—	—	
15	Alex Gonzalez	VT	Psychologist	Matched	Cameron Patel	VT	0.848	
16	Quinn Cooper	MT	Psychologist	Matched	Skyler Cooper	MT	0.852	
17	Quinn Gonzalez	OK	Psychologist	Unassigned	—	—	—	
18	Logan Gonzalez	MI	Social Worker	Unassigned	—	—	—	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
19	Peyton Bennett	AZ	Counselor	Matched	Reese Chen	AZ	0.747	
20	Logan Patel	MO	Marriage and Family Therapist	Matched	Drew Cooper	MO	0.851	
21	Morgan Brown	NV	Counselor	Matched	Hayden Moore	NV	0.841	
22	Reese Jenkins	MN	Psychologist	Matched	Peyton Jenkins	MN	0.863	
23	Morgan Rivera	CO	Marriage and Family Therapist	Matched	Taylor Bennett	CO	0.819	
24	Riley Patel	CO	Social Worker	Matched	Riley Reed	CO	0.856	
25	Jordan Wilson	OK	Psychologist	Unassigned	—	—	—	
26	Finley Brooks	AL	Marriage and Family Therapist	Unassigned	—	—	—	
27	Casey Nguyen	FL	Marriage and Family Therapist	Matched	Elliot Chen	FL	0.873	
28	Morgan Hernandez	CA	Marriage and Family Therapist	Matched	Emerson Parker	CA	0.804	
29	Sam Lee	AL	Psychologist	Unassigned	—	—	—	
30	Elliot Kim	MA	Counselor	Matched	Riley Ramirez	PA, MA	0.852	
31	Skyler Reed	LA	Psychologist	Unassigned	—	—	—	
32	Drew Garcia	VA, IN, NH	Marriage and Family Therapist	Matched	Rowan Patel	NH	0.847	
33	Skyler Garcia	NV	Psychologist	Matched	Hayden Moore	NV	0.726	
34	Cameron Kim	VT	Psychologist	Matched	Cameron Patel	VT	0.848	
35	Skyler Rivera	MN	Counselor	Matched	Quinn Hernandez	RI, MD, MN	0.873	
36	Reese Garcia	IA	Counselor	Matched	Taylor Lee	IA	0.834	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
37	Riley Gonzalez	NM	Social Worker	Matched	Avery Jenkins	NM	0.770	
38	Quinn Clark	ND	Psychologist	Unassigned	—	—	—	
39	Jordan Chen	VA	Social Worker	Matched	Casey Bennett	VA	0.833	
40	Skyler Nguyen	ID	Counselor	Unassigned	—	—	—	
41	Morgan Martinez	NV	Psychologist	Matched	Hayden Moore	NV	0.806	
42	Hayden Garcia	IN, LA	Social Worker	Matched	Taylor Chen	IN	0.695	
43	Alex Reed	ND	Marriage and Family Therapist	Matched	Quinn Brown	ND	0.799	
44	Taylor Davis	MD	Social Worker	Matched	Avery Lopez	MD	0.817	
45	Finley Rivera	FL	Psychologist	Matched	Logan Lee	FL	0.796	
46	Hayden Clark	ID	Marriage and Family Therapist	Unassigned	—	—	—	
47	Reese Reed	UT	Psychologist	Unassigned	—	—	—	
48	Peyton Clark	LA	Counselor	Unassigned	—	—	—	
49	Finley Clark	LA	Marriage and Family Therapist	Unassigned	—	—	—	
50	Peyton Brown	MD	Social Worker	Matched	Avery Lopez	MD	0.826	
51	Dakota Nguyen	PA	Marriage and Family Therapist	Unassigned	—	—	—	
52	Peyton Wilson	RI	Counselor	Matched	Quinn Hernandez	RI, MD, MN	0.833	
53	Dakota Reed	NE	Social Worker	Matched	Jordan Brown	NE	0.732	
54	Elliot Gonzalez	GA	Marriage and Family Therapist	Matched	Riley Brown	GA	0.670	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
55	Jamie Brown	MS	Psychologist	Unassigned	—	—	—	
56	Hayden Bennett	CA	Psychologist	Unassigned	—	—	—	
57	Logan Nguyen	OR	Psychologist	Matched	Finley Brown	GA, OR	0.798	
58	Skyler Brooks	NV	Counselor	Matched	Hayden Moore	NV	0.833	
59	Kendall Rivera	MT	Marriage and Family Therapist	Matched	Reese Brown	MT, DE	0.737	
60	Jamie Kim	IA	Psychologist	Matched	Reese Lopez	IA	0.803	
61	Emerson Cooper	CA	Counselor	Matched	Emerson Parker	CA	0.805	
62	Peyton Hernandez	UT	Counselor	Unassigned	—	—	—	
63	Peyton Brooks	IN	Counselor	Unassigned	—	—	—	
64	Casey Clark	MN	Psychologist	Matched	Jordan Ramirez	MN	0.892	
65	Cameron Clark	ME	Social Worker	Unassigned	—	—	—	
66	Kendall Hernandez	DE	Counselor	Matched	Elliot Hernandez	DE	0.800	
67	Riley Lopez	OH	Counselor	Matched	Kendall Jenkins	OH	0.756	
68	Logan Brown	SD	Psychologist	Matched	Dakota Davis	SD	0.818	
69	Morgan Bennett	IN	Counselor	Matched	Elliot Clark	IN, WY, FL	0.783	
70	Alex Brooks	KS	Social Worker	Matched	Kendall Bennett	KS	0.813	
71	Quinn Garcia	TX	Counselor	Matched	Cameron Lee	TX	0.771	
72	Elliot Lopez	WA	Marriage and Family Therapist	Matched	Hayden Wilson	WA	0.827	
73	Morgan Parker	NV	Marriage and Family Therapist	Matched	Sam Bailey	NV	0.656	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
74	Emerson Brooks	OR	Counselor	Matched	Skyler Davis	OR	0.761	
75	Sam Kim	AL	Social Worker	Matched	Sam Hernandez	AL, WV, IN	0.842	
76	Quinn Nguyen	IA	Marriage and Family Therapist	Matched	Taylor Lee	IA	0.827	
77	Dakota Clark	AR	Counselor	Unassigned	—	—	—	
78	Jordan Lee	OK	Psychologist	Unassigned	—	—	—	
79	Kendall Kim	NJ	Marriage and Family Therapist	Matched	Skyler Parker	NJ	0.801	
80	Drew Bailey	AK	Counselor	Unassigned	—	—	—	
81	Skyler Chen	IN	Counselor	Matched	Sam Hernandez	AL, WV, IN	0.853	
82	Finley Gonzalez	MS	Psychologist	Unassigned	—	—	—	
83	Cameron Hernandez	FL	Counselor	Matched	Logan Lee	FL	0.780	
84	Elliot Reed	IL	Counselor	Matched	Alex Bennett	IL	0.870	
85	Harper Cooper	NJ	Marriage and Family Therapist	Matched	Skyler Parker	NJ	0.799	
86	Logan Hernandez	KS	Marriage and Family Therapist	Matched	Kendall Bennett	KS	0.859	
87	Reese Moore	OK	Counselor	Matched	Kendall Martinez	OK	0.813	
88	Cameron Gonzalez	WY	Counselor	Matched	Jamie Gonzalez	WY	0.742	
89	Elliot Lee	CA	Social Worker	Matched	Emerson Parker	CA	0.821	
90	Elliot Patel	NJ	Social Worker	Matched	Riley Chen	NJ	0.814	
91	Finley Lee	MN	Counselor	Matched	Jordan Ramirez	MN	0.870	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
92	Dakota Brown	NE	Psychologist	Matched	Jordan Brown	NE	0.775	
93	Emerson Nguyen	ND	Counselor	Unassigned	—	—	—	
94	Rowan Brown	MO	Marriage and Family Therapist	Matched	Drew Cooper	MO	0.817	
95	Emerson Gonzalez	NM	Marriage and Family Therapist	Matched	Avery Jenkins	NM	0.786	
96	Casey Kim	IA	Psychologist	Matched	Harper Ramirez	IA	0.846	
97	Peyton Lopez	OR, GA, IL	Psychologist	Matched	Alex Bennett	IL	0.854	
98	Quinn Ramirez	MI	Counselor	Matched	Alex Wilson	MI	0.838	
99	Hayden Lopez	MS	Social Worker	Matched	Jamie Nguyen	MS	0.864	
100	Elliot Martinez	WA	Psychologist	Matched	Hayden Wilson	WA	0.835	
101	Elliot Garcia	ID	Psychologist	Matched	Alex Hernandez	ID	0.790	
102	Alex Kim	WY	Social Worker	Unassigned	—	—	—	
103	Reese Wilson	GA	Marriage and Family Therapist	Matched	Riley Brown	GA	0.683	
104	Rowan Lee	KS, VT	Social Worker	Matched	Kendall Bennett	KS	0.847	
105	Peyton Parker	HI	Psychologist	Matched	Kendall Clark	HI	0.761	
106	Hayden Cooper	NH	Social Worker	Unassigned	—	—	—	
107	Cameron Brown	CO	Marriage and Family Therapist	Matched	Taylor Bennett	CO	0.865	
108	Alex Nguyen	IL	Psychologist	Matched	Alex Bennett	IL	0.858	
109	Casey Moore	NY	Counselor	Matched	Elliot Rivera	NY	0.839	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
110	Skyler Martinez	IL	Social Worker	Unassigned	—	—	—	
111	Kendall Lopez	MT	Psychologist	Matched	Skyler Cooper	MT	0.807	
112	Kendall Reed	AZ	Marriage and Family Therapist	Matched	Quinn Patel	AZ	0.769	
113	Drew Moore	TX	Marriage and Family Therapist	Matched	Casey Bailey	TX	0.825	
114	Drew Ramirez	NM	Counselor	Matched	Taylor Gonzalez	NM	0.723	
115	Cameron Davis	SC	Counselor	Unassigned	—	—	—	
116	Cameron Reed	NV	Social Worker	Matched	Hayden Moore	NV	0.831	
117	Jamie Parker	OK	Marriage and Family Therapist	Matched	Kendall Martinez	OK	0.868	
118	Finley Martinez	WI	Social Worker	Matched	Reese Kim	WI	0.721	
119	Hayden Jenkins	KY	Psychologist	Matched	Avery Garcia	KY	0.771	
120	Cameron Cooper	MT	Marriage and Family Therapist	Matched	Reese Brown	MT, DE	0.763	
121	Jamie Brooks	NY	Social Worker	Matched	Elliot Rivera	NY	0.859	
122	Drew Reed	IN	Psychologist	Matched	Sam Hernandez	AL, WV, IN	0.851	
123	Avery Kim	WY	Social Worker	Unassigned	—	—	—	
124	Morgan Bailey	LA	Marriage and Family Therapist	Unassigned	—	—	—	
125	Dakota Cooper	NM	Marriage and Family Therapist	Matched	Peyton Lee	NM	0.773	
126	Finley Moore	OR	Counselor	Matched	Skyler Davis	OR	0.737	
127	Skyler Brown	FL	Counselor	Matched	Elliot Clark	IN, WY, FL	0.801	



	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
128	Cameron Brooks	MO	Marriage and Family Therapist	Matched	Drew Cooper	MO	0.832	
129	Alex Cooper	OK, TN, RI	Marriage and Family Therapist	Matched	Kendall Martinez	OK	0.889	
130	Finley Davis	VA	Marriage and Family Therapist	Matched	Casey Bennett	VA	0.783	
131	Jamie Bailey	MA	Counselor	Matched	Riley Ramirez	PA, MA	0.858	
132	Morgan Clark	IL	Marriage and Family Therapist	Matched	Alex Bennett	IL	0.852	
133	Casey Parker	OK	Counselor	Matched	Kendall Martinez	OK	0.854	
134	Emerson Lee	MI	Social Worker	Unassigned	—	—	—	
135	Riley Jenkins	ME	Psychologist	Unassigned	—	—	—	
136	Casey Garcia	GA	Counselor	Unassigned	—	—	—	
137	Drew Brooks	NY	Marriage and Family Therapist	Matched	Alex Jenkins	NY	0.831	
138	Riley Hernandez	NY	Social Worker	Matched	Elliot Rivera	NY	0.830	
139	Drew Jenkins	IL	Marriage and Family Therapist	Matched	Alex Bennett	IL	0.764	
140	Casey Davis	KS	Counselor	Unassigned	—	—	—	
141	Quinn Lopez	ND	Marriage and Family Therapist	Matched	Quinn Brown	ND	0.754	
142	Morgan Lopez	WA, FL	Counselor	Matched	Logan Lee	FL	0.809	
143	Hayden Bailey	OH	Social Worker	Unassigned	—	—	—	
144	Elliot Brooks	NM	Counselor	Matched	Taylor Gonzalez	NM	0.690	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
145	Kendall Davis	LA	Counselor	Unassigned	—	—	—	
146	Hayden Rivera	WY	Marriage and Family Therapist	Matched	Elliot Clark	IN, WY, FL	0.783	
147	Alex Brown	AL	Social Worker	Unassigned	—	—	—	
148	Alex Moore	NJ	Marriage and Family Therapist	Matched	Skyler Parker	NJ	0.797	
149	Jordan Parker	WV	Social Worker	Matched	Harper Hernandez	WV	0.810	
150	Taylor Brown	NH	Marriage and Family Therapist	Matched	Jordan Moore	NH	0.834	
151	Finley Bennett	TN	Counselor	Matched	Reese Brooks	TN	0.682	
152	Peyton Patel	NM	Psychologist	Matched	Avery Jenkins	NM	0.750	
153	Finley Bailey	NY	Social Worker	Matched	Elliot Rivera	NY	0.841	
154	Rowan Jenkins	OR	Counselor	Matched	Skyler Davis	OR	0.731	
155	Elliot Bailey	TN	Psychologist	Matched	Riley Wilson	TN	0.828	
156	Harper Clark	HI	Social Worker	Unassigned	—	—	—	
157	Jordan Bennett	NH	Psychologist	Matched	Jordan Moore	NH	0.851	
158	Taylor Cooper	NE	Social Worker	Unassigned	—	—	—	
159	Taylor Wilson	NJ	Marriage and Family Therapist	Matched	Alex Lopez	NJ	0.780	
160	Hayden Nguyen	TX	Marriage and Family Therapist	Matched	Drew Clark	TX	0.848	
161	Harper Davis	MS	Social Worker	Matched	Jamie Nguyen	MS	0.848	
162	Cameron Bailey	SC	Counselor	Matched	Reese Martinez	SC	0.675	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
163	Jamie Moore	NE	Social Worker	Matched	Jordan Brown	NE	0.762	
164	Sam Ramirez	OK	Psychologist	Unassigned	—	—	—	
165	Avery Patel	MA	Psychologist	Unassigned	—	—	—	
166	Cameron Chen	RI	Marriage and Family Therapist	Matched	Emerson Bailey	RI	0.719	
167	Taylor Parker	FL	Counselor	Matched	Elliot Clark	IN, WY, FL	0.816	
168	Drew Nguyen	TX	Psychologist	Matched	Casey Bailey	TX	0.838	
169	Harper Chen	IL	Marriage and Family Therapist	Matched	Alex Bennett	IL	0.900	
170	Jamie Chen	NH	Social Worker	Unassigned	—	—	—	
171	Logan Davis	TX	Social Worker	Matched	Finley Wilson	PA, OR, TX	0.815	
172	Rowan Reed	WY	Psychologist	Matched	Rowan Clark	WY	0.793	
173	Peyton Nguyen	ME	Psychologist	Unassigned	—	—	—	
174	Dakota Garcia	LA	Marriage and Family Therapist	Unassigned	—	—	—	
175	Peyton Ramirez	MA	Social Worker	Matched	Dakota Chen	MA	0.873	
176	Finley Hernandez	ID	Social Worker	Unassigned	—	—	—	
177	Morgan Davis	IN	Psychologist	Matched	Sam Hernandez	AL, WV, IN	0.847	
178	Avery Nguyen	AZ	Marriage and Family Therapist	Matched	Quinn Patel	AZ	0.813	
179	Morgan Nguyen	NC	Psychologist	Unassigned	—	—	—	
180	Drew Lee	SD	Social Worker	Matched	Dakota Moore	SD, SC, NJ	0.806	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
181	Harper Brown	VT	Psychologist	Matched	Cameron Patel	VT	0.838	
182	Rowan Brooks	KY	Social Worker	Unassigned	—	—	—	
183	Morgan Brooks	OH	Social Worker	Unassigned	—	—	—	
184	Dakota Bennett	UT	Marriage and Family Therapist	Matched	Avery Ramirez	UT	0.753	
185	Peyton Garcia	WV	Psychologist	Matched	Sam Hernandez	AL, WV, IN	0.833	
186	Avery Moore	GA	Social Worker	Matched	Finley Brown	GA, OR	0.811	
187	Emerson Reed	WV	Marriage and Family Therapist	Matched	Sam Nguyen	WV	0.884	
188	Avery Davis	IL	Social Worker	Unassigned	—	—	—	
189	Harper Moore	ME	Social Worker	Unassigned	—	—	—	
190	Casey Lopez	CT	Marriage and Family Therapist	Unassigned	—	—	—	
191	Drew Kim	OR	Marriage and Family Therapist	Unassigned	—	—	—	
192	Casey Gonzalez	WA	Marriage and Family Therapist	Matched	Hayden Wilson	WA	0.856	
193	Logan Kim	LA	Counselor	Unassigned	—	—	—	
194	Alex Rivera	PA	Counselor	Matched	Riley Ramirez	PA, MA	0.816	
195	Emerson Jenkins	IA	Marriage and Family Therapist	Matched	Taylor Lee	IA	0.808	
196	Emerson Hernandez	SC	Counselor	Matched	Reese Martinez	SC	0.706	
197	Harper Jenkins	NY	Counselor	Matched	Riley Bennett	NY	0.693	
198	Morgan Chen	MS	Psychologist	Unassigned	—	—	—	

	Associate	Associate State	Associate License	Match Status	Supervisor	Supervisor State	final_score	A
199	Morgan Ramirez	OH	Counselor	Matched	Kendall Jenkins	OH	0.733	